DEPARTMENT OF CITY PLANNING 100 LARKIN STREET · SAN FRANCISCO, CALIFORNIA 94102

FINAL

ENVIRONMENTAL IMPACT REPORT

SAN FRANCISCO EXECUTIVE PARK

for

THE YERBY CORPORATION

EE 75.198

Certified August 12, 1976

Volume II
Appendices

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VOLUME II -- APPENDICES

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Appendix A

Geological Engineering Study

NEW ORLEANS
NEW YORK
PORTLAND
SAN FRANCISCO
SANTA BARBARA
SYRACUSE
WHITE PLAINS

DAMES & MOORE

500 SANSOME STREET • SAN FRANCISCO, CALIFORNIA 941 [illegible]
CABLE: DAMEMORE

April 26, 1976

The Yerby Corporation
501 Tunnel Avenue
San Francisco, California 94134

Attention: Mr. George Yerby

Gentlemen:

Report
Review of Geotechnical Input for EIR
Proposed Office-Hotel Complex
Candlestick Cove
San Francisco, California
For The Yerby Corporation

INTRODUCTION AND PURPOSE

This report presents the results of our review of the proposed San Francisco Executive Park project, expressed from a geotechnical standpoint. The site is located between Candlestick Park Stadium and U.S. Highway 101, immediately north of the San Francisco-San Mateo County Line. The purpose of this submittal is to update our previous geotechnical studies performed at this site for another proposed project* because of the changes that have occurred in development concepts. This report supplements the earlier study and together with it can be used to describe the site's geologic setting and to serve as the basis for preliminary planning.

---

*Report, Preliminary Geological Engineering Study, Slope Stability and General Subsurface Conditions, Proposed Development, Candlestick Cove, San Francisco, California, May 16, 1969, Dames & Moore Job No. 2773-001.

PROPOSED GRADING

Extensive earthwork performed over a period of many years has created a complex terraced landscape. The existing topographic configuration is shown on Plate 1 of our previous report and can be categorized as follows:

1. an upper area characterized by steep individual cut slopes separated by a series of closely spaced horizontal benches creating a series of terraces;
2. a relatively flat low-lying portion partially underlain by man-made fill and formerly the site of a government housing complex;
3. an intermediate zone consisting of a few broad benches and ramps, representing the location of the most recent earthwork activity.

The planned development will involve regrading the site into a series of six pads as illustrated on Plate 1 of this report, which is a conceptual visualization of the grading scheme and does not reflect detailed or final grades. To develop this configuration, up to about 40 feet of material will be removed from the northern portion of the site in two major cuts and fills up to about 30 feet thick will be constructed, primarily in the western and southern parts of the site. On the order of 530,000 cubic yards of cut and 505,000 cubic yards of fill will be required. The grading scheme shown on Plate 1 would result in cut slopes as high as 100 feet and as steep as 1.4:1 (horizontal to vertical) with no intermediate benches, and fill slopes up to 30 feet high at 2:1 inclinations. However, we understand that these figures are considered strictly for conceptual purposes and would be refined during final design stages. Most of the cut will consist of Franciscan sandstone and shale except in the extreme northeastern and southwestern portions where Franciscan greenstone will be encountered.

DISCUSSION

GENERAL

The intent of our review was to evaluate whether or not the present grading scheme is consistent with our earlier recommendations and to comment on possible modifications, if appropriate. Our opinions concerning the geotechnical aspects of the planned construction are based on a qualitative assessment of the development concepts. Because final grades, building locations, and design details have not been prepared, no rigorous engineering analyses were performed.

CUT SLOPE STABILITY

Our original recommendations called for a continuation of the terracing or stepped-cuts by excavating future slopes no steeper than 2:1 overall with benches on the order of 30 feet apart vertically. The primary reason for this was to improve overall stability, in addition to provide areas to contain local minor slipouts and erosional debris, to permit equipment accessibility for maintenance and to facilitate landscaping. The present conceptual grading plans include a continuous cut slope up to 100 feet high at a 1.7:1 inclination and with no provision for intermediate benches on any cut slope. Although these slopes could remain stable for many years, the likelihood of slope failures would be increased due to the steeper inclination and the adverse consequences of local slides would be magnified due to the lack of intermediate benches.

We suggest that the cut slopes required to develop the planned building pads be designed to configurations consistent with our earlier recommendations, specifically overall slopes no steeper than 2:1 with provisions for benches rather than continuous cut. Based on discussions with your engineers, we understand that this is the intent for final design purposes.

FILL EMBANKMENTS

No unusual problems associated with the planned fills are envisioned provided that the fill sites are properly prepared, that fills are adequately keyed into the underlying slopes, and that adequate subdrainage is incorporated in the design, particularly in the western part of the site where a thick fill will be constructed over existing ravines.

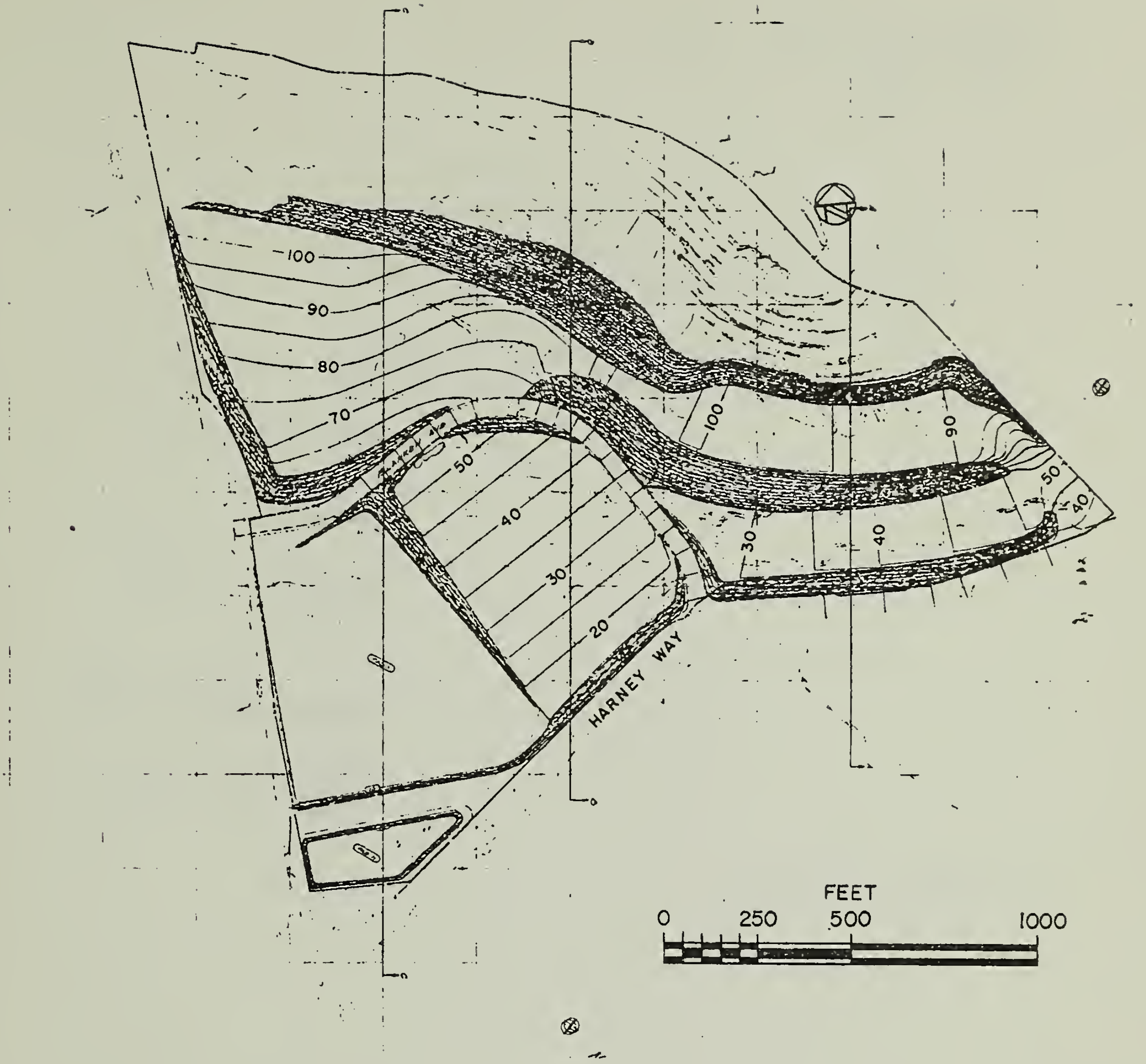
EXISTING LANDSLIDES

Two moderate-sized and several smaller landslides were identified and discussed in the previous report. The planned grading will probably remove some of the small slumps. We recommend cleaning up the two larger slides and reestablishing surface drainage around them, but do not recommend rebuilding the slopes. Reconstruction would be very difficult, very expensive, and would serve no useful purpose. In addition, we suggest sloping the upper portion of the slide that encroaches on Bayview Park property back to a flatter configuration to improve the stability of this area. The flattening should be performed in the soil overburden portion of the affected area, because this is the weakest unit involved in the movement.

FOUNDATION CONSIDERATIONS

Based on our knowledge of the project site and our review of the planned construction concepts, it is our opinion that unusual foundation problems would not be encountered. Up to about six feet of bay mud deposits are present in the southern part of the site under an existing overburden of variable thickness as indicated on Plate 1 of our previous report. As that report concluded, the mud probably has completely consolidated under the weight of fill that has now been in place for over 30 years. Some additional consolidation of the mud is expected under the planned 9 to 10 feet of new fill, but this is not judged to be a significant factor in the construction and performance of the proposed moderate-sized structures. However, formal foundation investigations and engineering analyses will be required once the final building layouts and preliminary design have been developed.

This report has summarized our opinions concerning the planned project expressed from a geotechnical standpoint. We trust it provides you with the information you need to file an acceptable Environmental Impact Report. Should you have any questions concerning this submittal, please contact us. The following Plate is attached and completes this report.



▨ MAJOR NEW SLOPES

REFERENCE: DRAWING ENTITLED S.F. EXECUTIVE PARK
BY KCA ENGINEERS

PROPOSED GRADING PLAN

Plate 1 - Proposed Grading Plan

Yours very truly,

DAMES & MOORE

Joseph J. Jeno
Partner

Raymond H. Rice

Raymond H. Rice
Engineering Geologist

JJJ: RHR: hmj
3 copies submitted

cc: Whisler Patri

REPORT
PRELIMINARY GEOLOGICAL ENGINEERING STUDY
SLOPE STABILITY AND GENERAL SUBSURFACE CONDITIONS
PROPOSED DEVELOPMENT, CANDLESTICK COVE
SAN FRANCISCO, CALIFORNIA

Dames & Moore

Job No. 2773-001

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DAMES & MOORE

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PARTNERS: WILLIAM W. MOORE • WILLIAM ENKEBOLL • ROBERT D. DARRAGH • CHARLES L. NICHOLS • DONALD F. JAVETE
ASSOCIATES: CARL W. GARBE • PETER E. QUINN • JAMES ANGEMEER • BOHDAN I. MADUKE • H. MORGAN NOBLE
CHIEF ENGINEER: LEON WINTERS

May 16, 1969

Job No. 2773-001

Kirker, Chapman and Associates
111 New Montgomery Street
San Francisco, California 94105

Attention: Mr. Carl E. Kirker

Gentlemen:

This letter transmits eight complete copies and twenty copies of text only of our report, "Preliminary Geological Engineering Study, Slope Stability and General Subsurface Conditions, Proposed Development, Candlestick Cove, San Francisco, California." Authorization for our work was received from Kirker, Chapman and Associates in a letter dated April 2, 1969.

It is our opinion that the proposed development is feasible from a geological and foundation engineering viewpoint. Further mass excavation should be accomplished by cutting overall slopes that are flatter than those previously cut. Adequate drainage, erosion control, and periodic inspection and maintenance measures should be implemented. For planning purposes, no major foundation problems are anticipated.

It has been a pleasure working with you on this very interesting project. Should you have any questions concerning the contents of this report, please contact us.

Yours very truly,

DAMES & MOORE

Charles L. Nichols

Charles L. Nichols

CLN:dh

Enclosures: 28

REPORT

PRELIMINARY GEOLOGICAL ENGINEERING STUDY
SLOPE STABILITY AND GENERAL SUBSURFACE CONDITIONS
PROPOSED DEVELOPMENT, CANDLESTICK COVE
SAN FRANCISCO, CALIFORNIA

INTRODUCTION AND PURPOSE

This report presents the results of our preliminary engineering geology study of the subject property. The site comprises about 77 acres, located between Candlestick Park Stadium and U.S. Highway 101, immediately north of the San Francisco-San Mateo County line. It is bounded on the north by Bay View Park, which is owned by the City and County of San Francisco and on the south by Harney Way. Plate 1, Site Plan, presents the boundaries and existing topography of the site.

The purpose of this study is to evaluate the present and anticipated future stability of the hillside portions of the site and to comment on the probable subsurface conditions of the lower-lying portion of the site on the basis of a review of existing information. The report provides basic data to aid in the formulation of overall development plans which may include the continuation of mass excavation of the site.

PROPOSED DEVELOPMENT

We understand it is planned to develop this property for residential use, possibly by constructing single-family dwellings, town houses, and apartment units. Some commercial property may also be developed. Possible waterfront and other recreational facilities will be considered.

The excavation required to produce the final topographic configuration of this area will provide a source of fill material. Ultimate plans will take into consideration the economic aspects of proposed grading schemes by comparing the market for excavated fill and property values of the developed site.

METHOD OF INVESTIGATION

Our studies were performed in accordance with the scope of work outlined in our proposal dated March 31, 1969.

1. A literature study was performed during which available pertinent information was reviewed.
2. Air photos of the site taken annually from 1963 through 1968 were studied to observe the changes the hill has undergone during excavation operations and the location and character of unstable zones.
3. A site reconnaissance was performed by one of our engineering geologists who also prepared a geologic map of the area. This map is presented as Plate 2.
4. Our geologic interpretation of the site was reviewed by an independent consulting geologist, Burton H. Marliave of Lafayette.

5. A brief comparison was made between the site and two geologically similar areas.
6. The geologic and engineering characteristics of the site were discussed with persons familiar with the area, including M. G. Bonilla, geologist with the U. S. Geological Survey, and Douglas and Wayne Truitt, engineers with the firm of Easley and Brassy.
7. During the course of our studies our progress was reviewed with Messrs. Carl Kirker and Joseph Yarnell of the firm of Kirker, Chapman & Associates.

SITE DESCRIPTION

TOPOGRAPHY

The site contains two general topographic conditions, a steeply-sloping terraced hillside and a flatter lowland area. Candlestick Hill's maximum elevation is over 450 feet above sea level. The northern boundary of the site ranges in elevation roughly between 250 and 390 feet at the southern property line of Bay View Park.* Old maps indicate that the original configuration of the hill's southern slope was between 2.5:1 and 3:1 (horizontal to vertical). Recent earthwork has modified this configuration as discussed in a later section.

The relatively flat low-lying area occupies the southern portion of the site and ranges in elevation from 10 to 20 feet. Presently a gently sloping and broadly terraced transitional area separates the lowland from the steeply cut hillside. The lower portions of the site contain old city streets and formerly were occupied by government housing units.

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*City of San Francisco Datum: 8.6 feet above MSL.

GEOLOGY

Regional - The San Francisco Peninsula lies in the California Coast Range Province which is located within the geologically youthful Circum-Pacific mountain-building belt. The Coast Ranges lie between the Continental Shelf on the west and the Great Valley Province on the east. This region is manteled over large areas by a thick blanket of fragmented sedimentary rocks.

The Franciscan assemblage, of which the rocks at the site are a part, consists of predominantly sedimentary rocks roughly 100 to 150 million years old. Relatively recent deformation, involving folding, thrust faulting, high-angle reverse faulting, and strike-slip movement has distorted the geologic record and masked many of the relationships.

The land in the vicinity of San Francisco Bay is differentiated into three crustal blocks, segregated by strike-slip fault systems showing large lateral displacements. Candlestick Hill lies within the San Francisco-Marin block which is separated from the Berkeley Hills block to the east by the Hayward Fault Zone and from the Montara block on the west by the San Andreas Fault System.

Local - Rocks exposed at the project site can be classified into three major types. Their distribution and relationships are indicated on the Site Geology sheet, Plate 2, and on cross sections presented as Plates 3 through 5. A series of 10 photographs, presented on Plates 6 through 9, shows the existing site conditions.

A. ROCK TYPES

1. Greenstone - Greenstones are very fine to medium grained altered volcanic rocks with predominantly basaltic composition. At the site they range from relatively fresh, massive and dense greenish rocks, to altered and weathered highly fractured bodies typically yellow-orange or rust-brown colored.

2. Sedimentary Rocks - The sedimentary rocks encountered at the site are predominantly fine to medium grained sandstone with smaller amounts of interbedded shales and siltstones. The rocks are brown colored where weathered and dark grey where fresh, the different colors reflecting oxidation of the component minerals during the weathering process.

The sedimentary rocks typically show the effects of deformation. During episodes of folding, the weaker shale and siltstone units become highly sheared and pulverized and the more competent sandstone units frequently show rounding due to slippage movements. The result is a matrix of unstable sheared shale with inclusions of more competent rounded sandstone masses. Portions of the site are underlain by more massive sandstone units showing little or no shearing deformation. Joints and fractures are typically iron and manganese stained.

3. Chert - Chert is a silica-rich microcrystalline sedimentary rock. At the site it occurs as:

(a) A thinly layered sequence of red beds (typically up to about two inches thick) with very thin red shale interbeds; these units are highly fractured and contorted and joint surfaces commonly are manganese stained.

(b) An altered form of the above unit which has become yellow-white or green colored due to the action of heat and chemically-charged fluids associated with nearby igneous activity.

(c) A massive, typically structureless red variety showing frequent baked, slickensided surfaces.

A localized instance of serpentinization was noted at the site in the vicinity of coordinates N6700 and E9750. This process is not completely understood by geologists, but it is a chemical alteration of rock frequently resulting in a weak, unstable unit. Serpentinization is usually associated with shear zones. It is anticipated that further exposures of this material might be encountered at the site, but the volume probably will not be significant to development plans.

B. AREAL DISTRIBUTION AND STRUCTURE

The distribution of rock units, shown on Plate 2, indicates that the existing hillside is underlain by alternating, essentially parallel bands of volcanic and sedimentary materials. The overall structural trend is consistent with the regional trend of the Coast Ranges, that is, northwest to southeast. The rock units typically dip toward the northeast at angles ranging from about 25 to 55 degrees. Thus, the site reflects a monoclinal structure, trending toward the northwest and dipping toward the northeast. This is confirmed by the information obtained during the construction of the Candlestick Point Sewer Tunnel, which passes under the center of the hill in a north-south direction. The cross-sections presented on Plates 3 through 5 show this relationship schematically.

A central band of sandstone and shale, roughly 400 feet wide in plan, is flanked on both sides by greenstone (volcanic) units. The hill is capped by chert, which because of its resistance to weathering, enables the development of the topographic high. Several scattered exposures of chert are observed over the site, usually associated with volcanic material.

SEISMICITY

California is located within the seismically active Circum-Pacific Earthquake Belt. The recorded seismic history of the San Francisco Bay Area extends from about 1800 to the present, indicating at least 5 very strong earthquakes: 1836, 1838, 1865, 1868, and 1906. Moderately strong shocks have occurred as recently as March of 1957.

Active faults are usually defined as those along which movement has occurred within the recent geologic past. Candlestick Hill lies about 5 miles northeast of the San Andreas Fault System and about 13 miles southwest of the Hayward Fault Zone, the most seismically active zones in this region. Thus, it is reasonable to expect that movements along these faults would be felt at the site.

SOILS

The residual soils that formerly covered the upland portions of the site showed large shallow unstable areas but have been almost completely removed by recent earthwork. The lower-lying, undisturbed portions of the site are underlain by residual soils formed by the in-place weathering of rock, and alluvial soils formed by erosional and depositional processes. Work performed by Dames & Moore in 1943 for the Housing Authority, City and County of San Francisco, indicated over 15 feet of sandy and clayey alluvial soils in places.

A review of old maps shows that a sand bar once occupied the area just inland of the present alignment of Harney Way. This bar sheltered a shallow, mud-bottomed lagoon from the open waters of San Francisco Bay. Plate 1 shows the approximate outline of this old lagoon. The soils investigation performed in 1943 indicated up to about six feet of soft, compressible peaty and clayey soils in this old lagoonal area. Alluvial deposition and subsequent artificial filling have buried these bay mud deposits. The sig-nificance of the buried bay muds will be discussed in a later section.

GROUND WATER

Several seepage zones were observed at the site during the field mapping program. Most of these were concentrated at recent slide areas, contacts between the different rock formations, or structural troughs within a folded unit. The major seeps observed are indicated on Plate 2. Our inspections were made in April, not long after a season of relatively heavy rainfall.

EARTHWORK HISTORY

The former lagoon area in the southern portion of the site was partially filled by natural alluvial deposition due to erosion of the surrounding hills. Approximately 25 years ago, up to about 8 feet of fill was placed to provide foundation support for government housing. In 1959-60 Harney Way was built by placing a pad of fill over the underlying soft bay muds.

Since 1963 Candlestick Hill has been worked as a source of sanitary land fill by the contracting and engineering firm of Easley and Brassy. About 2-million cubic yards of earth and rock have been excavated since 1963 (roughly 325,000 cubic yards per year).

The existing steeply-cut slopes differ from one end of the hill to the other. The eastern end of the site shows a maximum amount of cutting, about 230 feet vertically (from about Elevation 360 to 130), while the western half of the site has been cut only from about 60 to 100 feet vertically. A transitional zone connects the two ends of the site.

DISCUSSION AND RECOMMENDATIONS

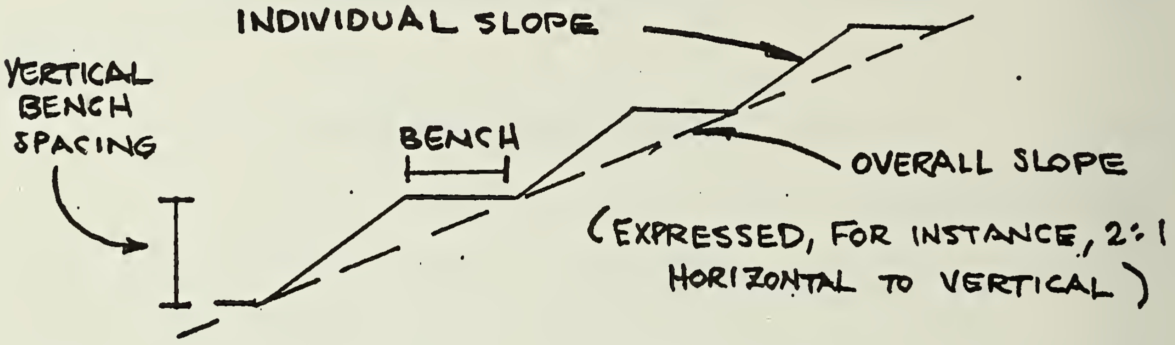
ANALYSIS PHILOSOPHY

The geologic and engineering evaluation of the project site was performed by using an empirical rather than an analytical approach. The extensive cut slopes provide an excellent, essentially continuous rock exposure probably unique in the San Francisco Bay Area. Thus, visual observations precluded the need for test borings and laboratory testing. Likewise, it was decided that the slope stability could be evaluated on the basis of past experience and by studying the available rock exposures and comparing them with slope behavior in geologically and topographically similar areas.

As stated previously, the purpose of this investigation is to provide basic data to aid in the formulation of overall development plans. The report is not intended to provide specific foundation recommendations or detailed design criteria. It is anticipated that some modifications will be required as the excavation and construction progress; however, the overall development criteria should remain substantially unchanged.

SLOPE STABILITY

Present Stability - The development of a cut slope can be effected in several ways; by a uniform slope, a series of straight slopes at varying angles, or a series of straight slopes separated by near horizontal benches. The nomenclature used in describing the geometry of a cut is shown in the following sketch:



The existing slopes were presumably cut in accordance with the provisions of a quarrying permit issued by the City and County of San Francisco. Plates 3 through 5 present three typical existing cut slope configurations in cross section at natural scale through the site at the locations indicated on Plate 1. Overall slopes across the site typically range from 1.3:1 to 1.6:1, flattening to about 1.9:1 toward the east. Individual cuts range from 1/2:1 to 3/4:1, vertical spacing averages about 25 feet, and bench widths vary from 15 to 20 feet but approach 10 feet in places. The benches are cut with sufficient longitudinal gradient to allow good surface runoff drainage.

Two moderately large recent landslides and numerous slipouts and slumps are presently observed at the site, as indicated on Plate 2. The two major slides are also identifiable on the topographic map, Plate 1, by irregular contour lines.

The slide located at about coordinates N7100 and E10,250 occurs at the interface between the overlying chert cap unit and the underlying greenstone (volcanics). The slide is about 200 feet wide and has wiped out all or part of three benches. This is an instance where an adverse structural relationship has enabled material to slide along the plane of weakness into the excavation. Here the contact between the two rock units slopes at an angle of about 45 degrees toward the south; i.e., adversely toward the cut face. The volcanic rocks immediately underlying the chert units frequently have become highly altered and weathered by percolating ground water, forming an impermeable clayey zone. Subsequently, downward percolating water cannot readily drain through the weathered greenstone and sets up seepage forces in the overlying bedded and fractured chert, which can result in sliding as observed in this case.

The slide located approximately at coordinates N7600 and E9300 seems to be a recent regeneration of an old unstable area. The slide is about 150 feet wide and has affected two benches. The topography uphill of this zone shows as a swale, and does not support tree growth as do the flanking areas. The soil overburden here is quite thick, probably up to ten feet, consisting of residual sandy, clayey topsoil and slope-wash which has formed a ravine fill. Groundwater seepage is observed in this region because it is concentrated in the topographic trough.

With the exception of three small erosional scars in the greenstone, the remaining slides and slipouts occur in the sedimentary rock units (sandstones and shales). As described in an earlier section, the sandstones and shales frequently show the effects of deformation during episodes of folding, resulting in a sheared, sometimes pulverized matrix with inclusions of hard competent sandstone. The slides have typically removed about half of one bench. Occasionally a slump will block the drainage along a bench, diverting it out and over the edge of the cut. This causes gullying in the underlying rocks which also contributes to the instability of the local area.

Future Stability - The stability of future cut slopes will be a function of the slope configuration and the character of the underlying rock including its strength, degree of weathering, and orientation of weakness planes such as bedding and jointing. Each of the rock types present at the site can be evaluated with respect to its stability characteristics.

The greenstones (volcanics) can be expected to remain relatively stable except when extremely weathered. Historically in the Bay Area these rocks do not slide except in the surficial zones. The site will probably be excavated to such a depth that the weaker surface zones overlying the greenstones will be removed.

The chert units will probably remain stable except in areas containing adverse structural relationships between cut slope, bedding, and fracture systems. Such a situation is observed on the northeastern flank of the hill facing Jamestown Avenue Extension where large masses have slid out or are presently sliding along planes controlled by bedding and jointing.

The areal extent of chert outcropping on the project site is small, and although some local zones might be expected to slump, the overall problem should not be significant to the development plans.

The major problem rock at this site will be the sedimentary units (the interbedded sandstones and shales). When sheared and weathered, these rocks are susceptible to erosion and slumping. Particular care will have to be exercised in developing slopes in these rocks; however, the anticipated excavation will probably remove the uppermost highly weathered and weakest units.

EFFECT OF SUBSURFACE CONDITIONS ON DEVELOPMENT PLANS (LOW-LAND AREA)

No major development problems are expected on the basis of available subsurface information. Although up to about six feet of relatively soft bay deposits underlie portions of the site, up to about eight feet of fill has been in place for over 25 years. Thus, the soft deposits have probably completely consolidated under existing loads.

We understand you are contemplating raising the grade 10 or 15 feet. This additional loading can be expected to cause additional compression of the soft soils. However, we would expect most of this to occur within a year, and would expect that future differential settlements due to compression of these soils would not be a significant factor for moderate size structures.

For the type of development presently under consideration, with relatively light structural loads, no elaborate or unusual foundation schemes are envisioned. Likewise, bearing capacities in soil and rock should not be critical factors in development plans.

EARTHQUAKE CONSIDERATIONS

Due to the proximity of the site (along with the entire Bay Area and much of California) to the active San Andreas and Hayward Fault Systems, earthquake vibrations of various magnitudes are expected to occur during the economic life of the project. The hillside portions of the site are composed mostly of dense and moderately hard rock that will exhibit generally favorable response to seismic forces, with relatively high frequency but low amplitude ground motions. It is our opinion that slope damage, if any occurs, will be concentrated in the more highly sheared sedimentary rock zones and will probably include loose surface material, but will not affect the entire cut slope.

The residual and alluvial soils and artificial fill encountered in the low-lying portions of the site probably will display moderate response to earthquake forces. It is our opinion that this can be adequately designed for.

SUGGESTED DEVELOPMENT CONSIDERATIONS

Slope Configurations - The development of a large cut slope by means of numerous individual slopes separated by essentially level benches, as has been started at the site, is the most practical approach from an excavation, maintenance, and probably esthetic standpoint. Benches are necessary to allow for maximum removal of fill material, excavation and maintenance equipment accessibility, buffer zones for rock falls and erosional debris, and for landscaping purposes.

The existing cut slopes are, at least presently, essentially stable. However, stability is time-dependent, and further slumping and

TABLE 1

VERTICAL SPACING (FEET)	25		30	
BENCH WIDTH (FEET)	15	20	15	20
INDIVIDUAL SLOPES	OVERALL SLOPES*			
0.50:1	1.10:1	1.30:1	1.00:1	1.17:1
0.75:1	1.35:1	1.55:1	1.25:1	1.42:1
1.00:1	1.60:1	1.80:1	1.50:1	1.67:1
1.25:1	1.85:1	2.05:1	1.75:1	1.92:1
1.50:1	2.10:1	2.30:1	2.00:1	2.17:1
1.75:1	2.35:1	2.55:1	2.25:1	2.42:1
2.00:1	2.60:1	2.80:1	2.50:1	2.67:1

TABULATION OF RESULTANT SLOPES

GIVEN: VERTICAL SPACING, BENCH WIDTH, AND INDIVIDUAL SLOPE sloughing can be anticipated. Due to the nearness of the top of the cut to the property line, only limited remedial measures can be economically implemented to improve the stability of these slopes, as is discussed in a later section.

---

*Refer to Sketch, page 10, for Slope Configuration Nomenclature

For future cuts, we recommend flattening the overall slopes to configurations no steeper than 2:1. At least 15-foot-wide benches spaced at vertical intervals with a maximum of 30 feet is advised for this development. An indication of the relationship between bench width, vertical spacing, individual slope angles, and resulting overall slope configuration is presented in Table 1.

We recommend leaving at least a 30-foot-wide bench or berm at the toes of the existing cut slopes. This will serve to increase the final overall slope stability and provide a buffer zone in the event that additional failures occur in the existing cut slopes. Plates 3 through 5 present the relationship between original and existing topography and illustrations of the suggested future configuration in cross section form.

The top of the existing cut lies within about 10 to 20 feet of the boundary between the project site and Bay View Park except for about 500 feet to the southeast of coordinates N7450 and E10,000. Here the cut diverges from the property line to a maximum of about 100 feet laterally, as shown on Plate 1. This area is underlain by chert which caps a greenstone unit, and has been the location of a recent landslide, described previously. To minimize the possibility of further sliding in this region we recommend flattening the upper portion of this slope by removing the chert adjacent to the slide zone. This chert unit is standing almost vertically in places, and will continue to slough and slide unless repaired by flattening.

Wherever possible, the remainder of the top of the cut should be flattened back to improve the stability of the cuts in the weak topsoil and slope-wash materials. Negotiations with the City might produce an understanding whereby these slopes could be flattened back (even encroaching onto City property in places) and an interceptor drainage system installed for mutual benefit.

We recommend cleaning up the existing and future small slumps and slipouts by removing the slide debris, but do not recommend rebuilding these areas by construction of sliver fills. Instead, in order to maintain the continuity of the benches, the upper slopes should be locally steepened enough to permit equipment access. This procedure should be inspected and controlled in the field by a qualified geologist or engineer.

We understand that one of the development schemes under consideration features a lowland area sloping upward at about a 10 percent gradient to the toe of the deep hillside cut. At the present time, we suggest that planning provide for a buffer zone about 50 feet wide between the toe of slope and building sites, and for such measures as thick shrubbery and fences along the toe of slope, to retain possible falling rock and to keep people off the slopes.

We believe that the development plans should be flexible enough to permit changes in slope configurations based on problems encountered during excavation and construction operations. As the excavation progresses, the slopes should be visually inspected to assure that the rock conditions are consistent with the design criteria. It is anticipated that local instances of unfavorable bedding or fracturing, or less stable rock formations will be encountered. However, these zones should not be extensive or detrimental to the overall development scheme. Flatter slopes in weak rocks may be compensated for by slightly steeper slopes in more competent units, resulting in very little change in overall slopes.

The sedimentary rock units occasionally contain huge hard sandstone bodies called "donnickers" within a sheared shaley matrix. These are subject to falling when the softer matrix material erodes. Some of these bodies are tens of feet in diameter and could cause considerable damage if allowed to roll. To avoid potentially dangerous rock falls of this type, protruding "donnickers" should be removed and the slope graded around them. Also, loosening of these rocks due to erosion should be detected during periodic inspections and maintenance programs.

Drainage Measures - Most landslides in the Bay Area are caused and/or accelerated by ground water. To minimize the infiltration of surface runoff into cut slopes, adequate drainage systems should be provided. The present benches slope inward to the toe of the next higher slope about one foot across their width and laterally at gradients of about three or four percent. These grades seem ample. An acceptable drainage system would include ditches lined with gunite or other appropriate material at the toe of each slope, with interceptor drains, probably of corrugated metal pipe, spaced at appropriate lateral intervals (probably on the order of 500 feet). The interceptor system would help minimize diversion of water over the slopes, thereby reducing gullying due to diverted runoff. Alternatively, the ditches could be constructed along the center lines of the benches to minimize clogging due to accumulation of material ravelling from the slope above, and growth of vegetation.

Paving or guniting the slopes and benches would be expensive, of limited value, and ugly, and is not recommended. Areas of known or suspected instability might be improved by installing hydraugers (horizontal drain pipes) into the slope at locations determined in the field.

Erosion Control Measures - With the exception of the chert, the rocks exposed at the site are subject to weathering, ravelling, and erosion. These phenomena occur at decreasing rates with time; i.e., rapidly after excavation then more slowly through the years. The greenstones weather fairly rapidly and tend to ravel as shown by the talus accumulation at the toes of the recently cut slopes. Gullying in these rocks is usually confined to fracture zones that are frequently clay filled and weaker than the surrounding material.

Alternate wetting and drying causes the sandstones and shales to decompose and erode rapidly, especially in the weathered zones. These rocks are more susceptible to gullying than the greenstones.

Planting the cut slopes with suitable vegetative cover may be the most effective erosion-control measure. The California Division of Highways could probably provide useful information on the types of vegetation to consider. However, to avoid excessive water infiltration into the cut slopes (thus decreasing stability), the planted portions should require a minimum of landscape watering.

Tree growth on the benches would have a limited beneficial effect although it will probably enhance the site from an esthetic standpoint. However, to allow adequate access for maintenance equipment, and to avoid burying trees in talus deposits and uprooting them due to minor sloughing it would be advisable to plant them on the outboard edges of benches, (providing the benches are wide enough), rather than at the toes of adjacent slopes. Trees should be of relatively small size, especially in the steeper slope areas.

Periodic Maintenance - To provide maximum stability and safety of the cut slopes we recommend periodic site inspections. Visual inspections by a qualified geologist or geological engineer could be planned on a yearly basis, preferably prior to the rainy season. This would allow the implementation of preventive measures and minimize potentially expensive remedial measures.

An understanding should be reached with the City and County of San Francisco regarding the repair of damage done to City property by soil and rock movements at the boundary with Bay View Park. Cleaning up and regrading the slide areas would probably not be an exorbitant expenditure. However, should the City require extensive subdrain systems and actual slope rebuilding, the cost will be appreciably more. Thus a clarification of this policy could enable the consideration of this factor in long-range maintenance budgeting.

Fill Material Characteristics - The major portion of the materials to to be excavated should provide relatively good quality fill. The weathered greenstone is the most workable and highest quality of the rock types. The major portion of the sedimentary rocks is expected to provide good fill; however, the sandstone "donnickers" will probably be hard to break down and place, and the crushed shale units will not yield very good fill. The shale is the only material that we anticipate may present a shrink-swell problem. The fill's overall rating would be good but not superior.

The following Plates are attached or enclosed and complete this report:

NB -- on file with City Planning

Plate 1 - Site Plan

Plate 2 - Site Geology

Plate 3 - Section A-A

Plate 4 - Section B-B

Plate 5 - Section C-C

Plate 6 - Photographs

Plate 7 - Photographs

Plate 8 - Photographs

Plate 9 - Photographs

Respectfully submitted,

DAMES & MOORE

Charles L. Nichols

Charles L. Nichols

Raymond H. Rice

Raymond H. Rice

May 16, 1969

Job No. 2773-001-03

APPENDIX B

MICROCLIMATE IMPACT ANALYSIS
FOR THE PROPOSED
SAN FRANCISCO EXECUTIVE PARK

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I.	Introduction	34
II.	Summary	34
III.	Site description	35
IV.	Project influence on wind and comfort	38
V.	Mitigation of adverse wind effects	41
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I. INTRODUCTION

Architects, engineers, and city planners designing urban structures are limited by lack of information on wind effects brought on by the presence of these structures, such as discomfort for pedestrians and wind-caused mechanical problems with doors, windows, and ventilating systems. Once a structure is built, remedial measures (if they exist at all) are usually very expensive.

It is virtually impossible to anticipate, by analysis or intuition, the winds that will be caused by a structure, since they are determined by very complex interactions of forces. Fortunately it is possible to predict the wind patterns and pressures around structures by testing scale models in a wind tunnel that can simulate natural winds near the ground. This allows the designer to foresee possible environmental and mechanical problems and alleviate them before the building is erected.

The purpose of this study is to determine the wind and comfort conditions on the site before and after construction of the proposed project, and to assist the designer to avoid climate- and wind-related problems.

The major effort in this study has been the assessment of wind and comfort conditions as they would be if the proposed project were built. Assessment of existing conditions is of minor importance since few people visit the site.

II. SUMMARY

Wind tunnel tests were conducted on a model of the San Francisco Executive Park site as it is now and as it would exist with the proposed project.

Large variations in wind exposure were found over the existing site. The upper areas are very windy, especially along plateaus. The western portion is sheltered by the elevated U.S. 101, especially during westerly winds. The rest of the site is moderately windy, except for small areas sheltered by local terrain features.

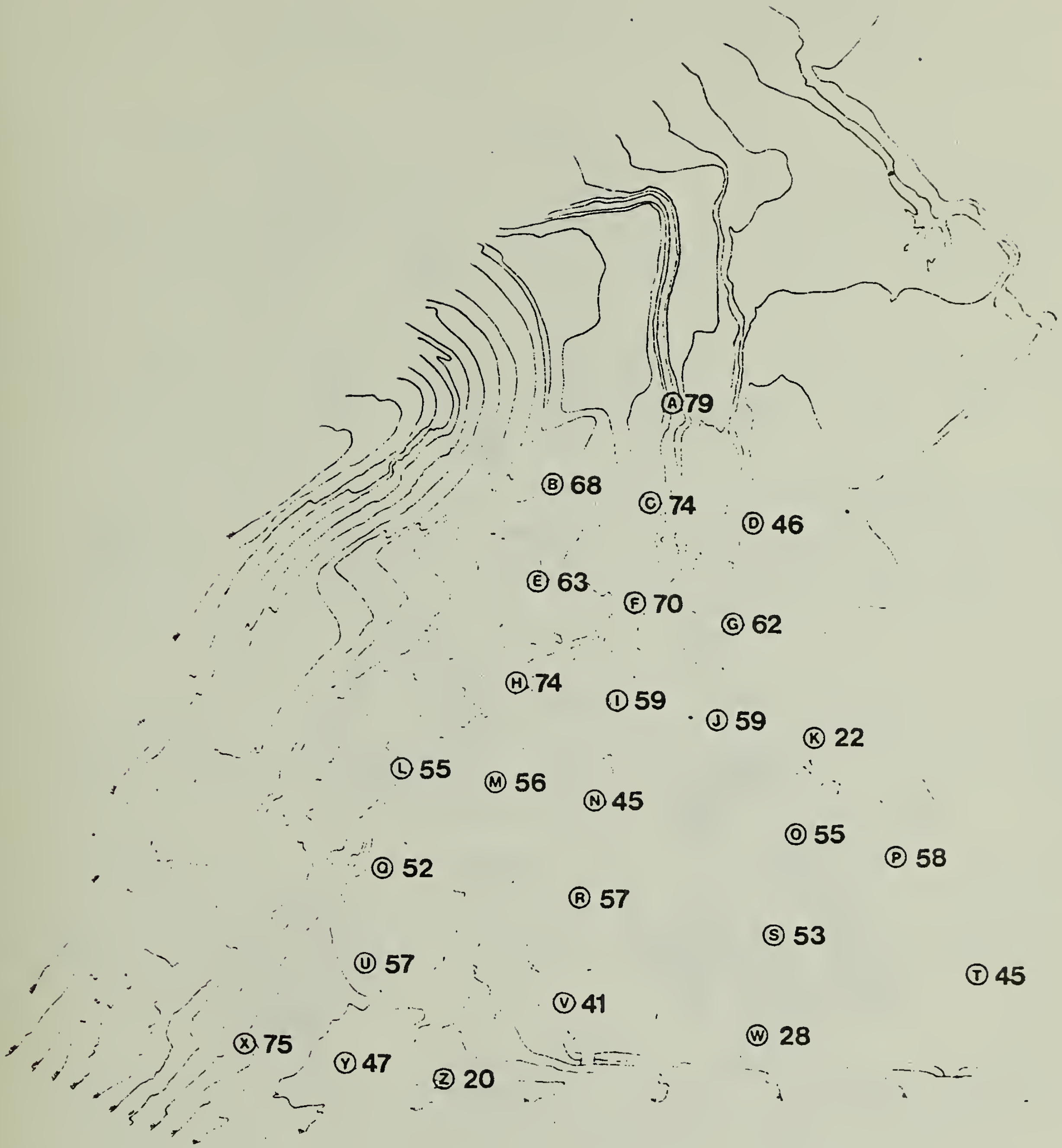
The project would reduce winds slightly in the open areas of the site, due to the added roughness and drag exerted on the wind by its various structures and topographic changes. Close to structures, however, wind exposure would vary from very sheltered to very exposed.

Each of the four areas comprising the project was analyzed separately. Areas 1 and 2 were found to be sheltered and would have low discomfort frequencies, primarily because they contain low-rise complexes and are at a low elevation. Area 1A is on an exposed plateau and the building configuration does little to reduce winds or discomfort. Area 3 was found to have the highest winds and the greatest potential for discomfort. The high-rise towers accelerate wind significantly at ground level. Coupled with the large shadow areas caused by these structures, this would cause frequent uncomfortably cool and windy conditions.

III. SITE DESCRIPTION

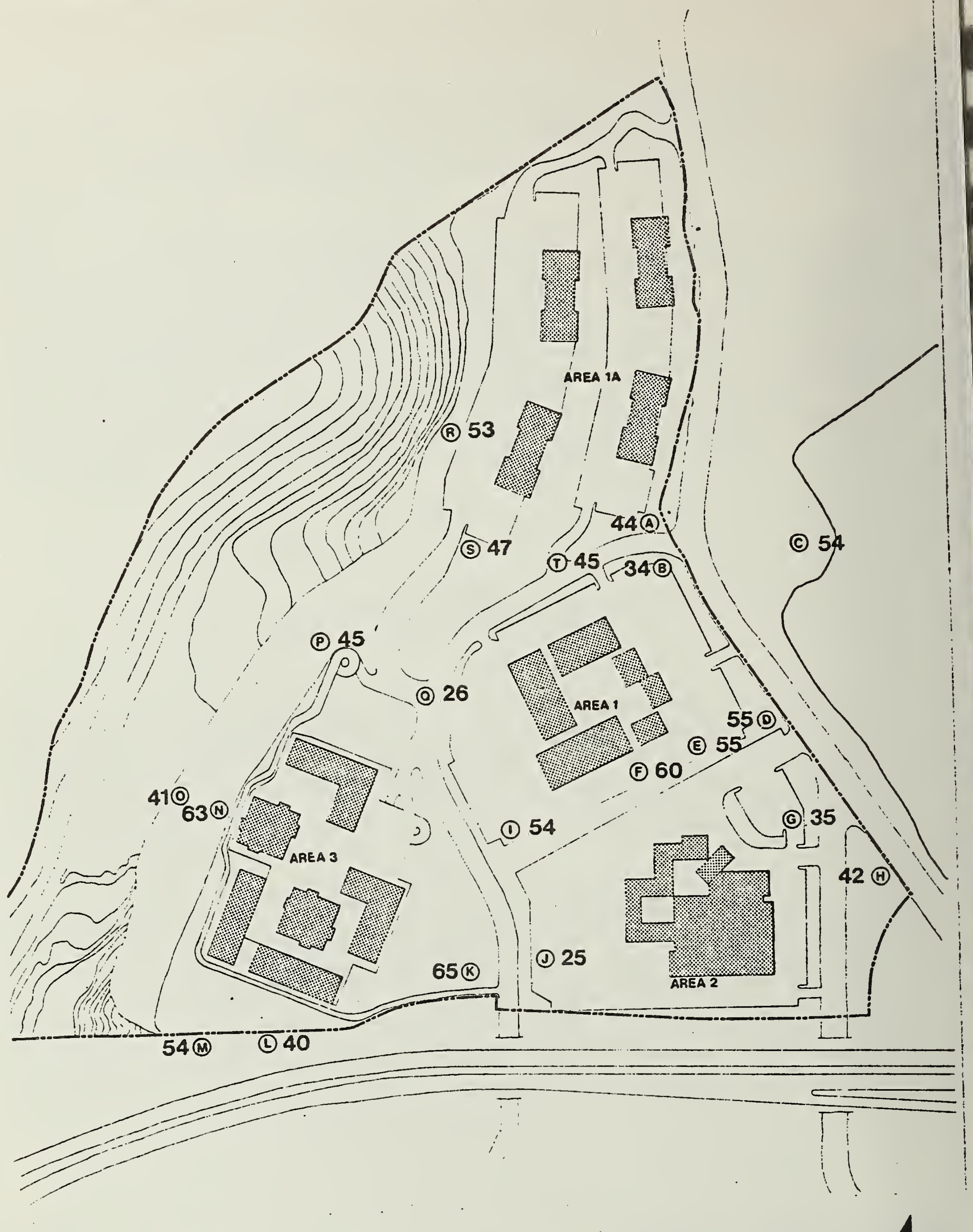
The site of the proposed project is open space and contains no buildings, relatively little vegetation, and little ground cover. The site is completely open to southwest, south, and southeast winds; the upper sections are also exposed to west and northwest winds. The Bayshore Freeway forms a berm along the west side of the site, and Bayview Hill extends along its north and northeast sides.

The proposed project includes four development areas (see Figure B-2). The entire site would be regraded. Area 1 would contain three 3-story buildings and three 1-story restaurants, arranged to form a protected inner court. Area 1A, along the mountain on the eastern side of the site, contains two 3-story and two 2-story buildings. Area 2 is the convention center and hotel, a large connected complex next to the freeway on the southwest side of the site. Area 3, the northwest corner and the highest part of the site, contains four 3-story buildings placed around two 15-story high-rises.



EXISTING SITE
WIND STRENGTH INDEX
(SEE DEFINITION ON PAGE 49 VOLUME II)

FIGURE B-1



PROPOSED SITE WIND STRENGTH INDEX

(SEE DEFINITION ON PAGE 49 VOLUME II)

FIGURE B - 2

IV. PROJECT INFLUENCE ON WIND AND COMFORT

A. ELEMENTS OF COMFORT IN SAN FRANCISCO

The elements that influence comfort are temperature, humidity, sunshine, precipitation, and wind. Their relative importance varies with geographical location and the characteristics of the local climate. For the San Francisco region, the most important factors are temperature, solar radiation, and wind.

Temperatures in San Francisco are moderate owing to the influence of marine air. Temperatures are highest in fall and lowest in winter; both spring and summer are normally cool, with a high frequency of low clouds and fog.

The intensity and frequency of sunshine are normally integrated into a single figure and expressed as "percentage of possible sunshine." San Francisco has two peak periods of sunshine, in April and in September. These months normally correspond to the transition periods between the strong marine airflow of summer and the transient storms of winter.

Wind in San Francisco is strongest in late spring and throughout the summer months, and lightest in winter. Summer winds have a large daily variation, with light winds during night and morning hours and peak winds in the afternoon. Westerly winds are dominant in all months but December and January.

The planner or architect has no control over outdoor temperatures. He does, however, have some control over the pattern of sunlight and shade and the speed of the wind. In the cool climate of the Bay Area, providing a comfortable outdoor environment requires maximizing exposure to sunlight while reducing winds as much as possible.

Winds on the site have been analyzed in terms of the Wind Strength Index (WSI), which is explained in detail in Section V.B.3. The WSI integrates wind measurements over all wind directions to produce a single value that can be interpreted as follows:

Wind Strength Index	Interpretation
0 - 20	Low winds
21 - 44	Moderate winds
45 - 70	High winds
> 70	Very high winds

The WSI is proportional to average wind speed and frequency of discomfort.

B. EXISTING SITE CONDITIONS

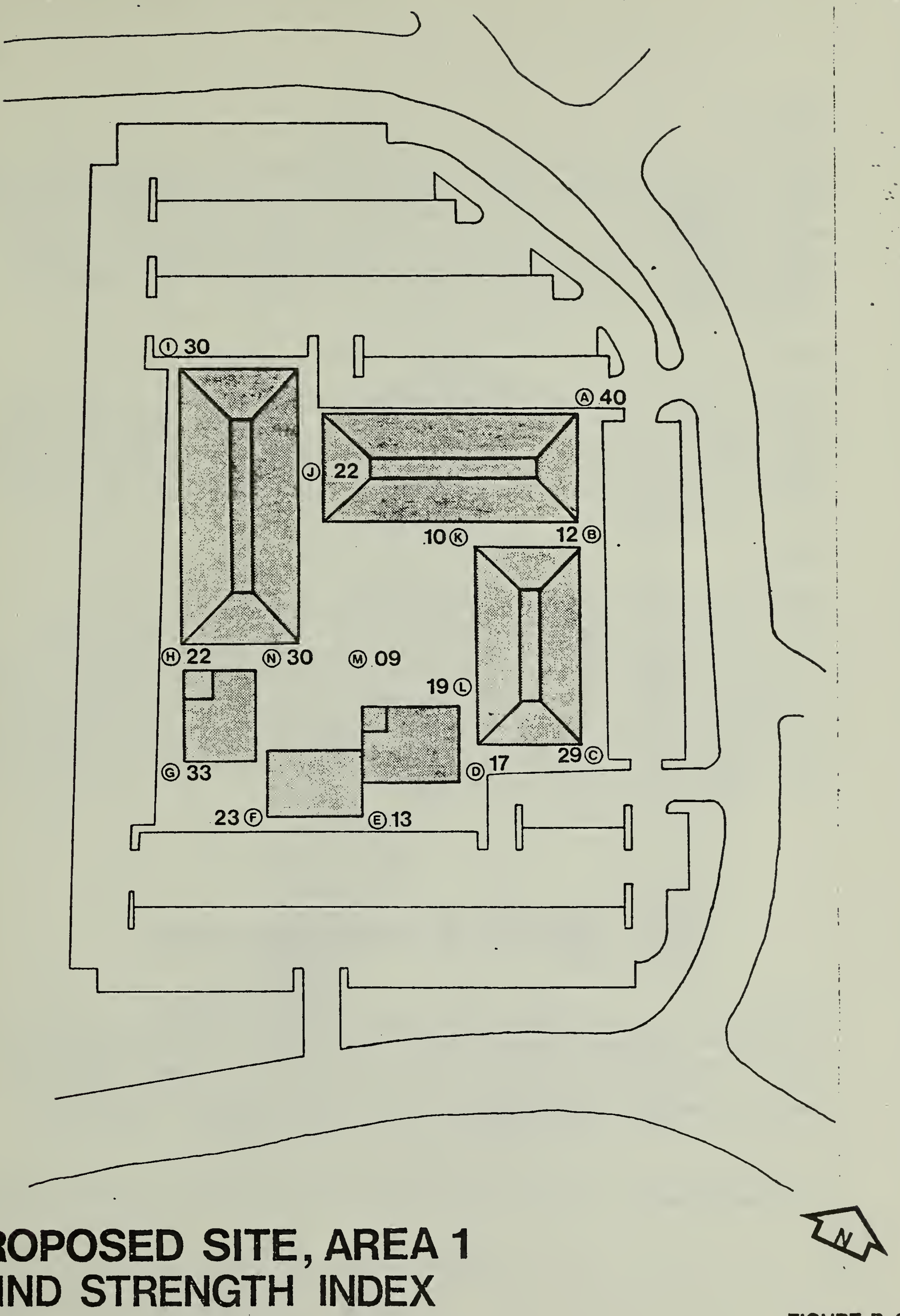
Wind Strength Index values for the existing site are shown in Figure B-1. The higher areas of the site are exposed to very high winds. Along plateau areas, local accelerations are evident. The lower areas of the site have high winds. Near U.S. 101 low winds are found because the elevated freeway provides shelter. This shelter is reduced rapidly with distance from the freeway.

C. SITE CONDITIONS WITH PROPOSED PROJECT

Figure B-2 shows WSI values for the overall site, excluding building areas. When compared to Figure B-1, it is evident that in general winds would be slightly lower with the project due to the drag and obstruction of project structures. Topographic changes would result in some increases, particularly at Point K, where areas formerly sheltered by the freeway would be exposed. Some local wind accelerations would occur near the edges of building complexes.

Area 1

Wind strengths for Area 1 are shown in Figure B-3. The configurations of the buildings result in low wind speeds throughout most of the complex. Near the corners of the complex, local wind acceleration would result in moderate wind strengths. The central courtyard would be sheltered and, because the lowest buildings would be to the south, it would be sunny. The light winds and lack of shadows in the courtyard would result in comfortable outdoor conditions a high percentage of the time.



PROPOSED SITE, AREA 1 WIND STRENGTH INDEX

(SEE DEFINITION ON PAGE 49 VOLUME II)

FIGURE B-3

Area 1A

Area 1A is relatively open and exposed and would be expected to have mostly moderate winds (Figure B-4). The entrances to all four buildings in this complex are on the north side. Because winds are generally higher on this side and because the area north of the buildings would be shadowed, pedestrians would experience a moderate frequency of discomfort approaching or leaving these buildings.

Area 2

Wind strengths at Area 2 are shown in Figure B-5. Winds are generally low throughout the complex, but some moderate winds are found near the perimeter of the area. The inner courtyards are very sheltered and would be comfortable. The main entrances to the complex (Points D and E) are also sheltered and would not be in shadow.

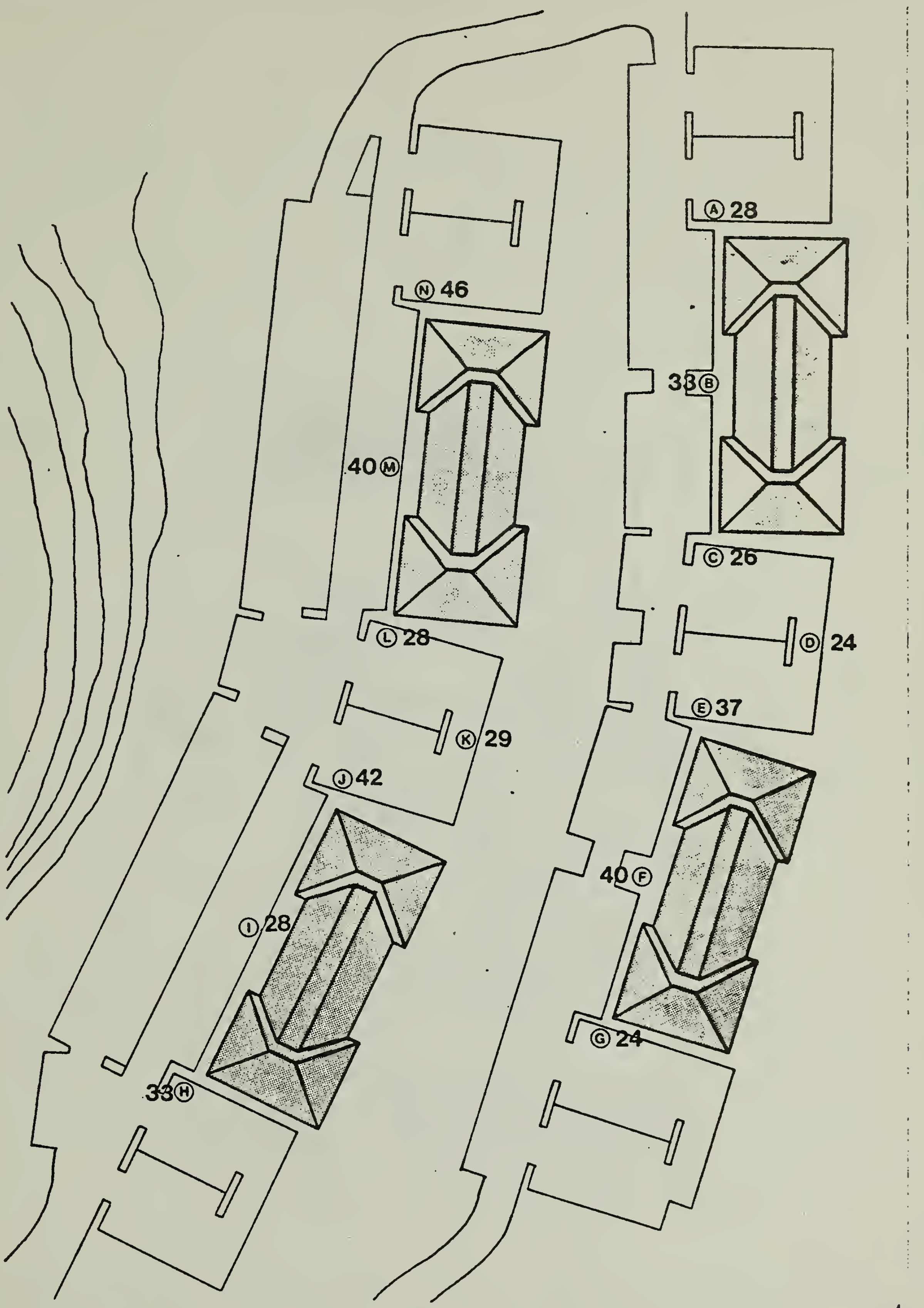
Area 3

Wind strengths at Area 3 would vary greatly (Figure B-6). The lower areas of the site (Points A, B, and Q) would be very sheltered and, because they would have southern exposure, would be sunny. The upper levels of the site would be greatly affected by winds caused by the two high-rise towers, which accelerate winds between them to high levels. Near the base of the towers winds would be moderate to high. Because much of this area would be in shadow a good portion of the day, relatively high discomfort frequencies are expected.

V. MITIGATION OF ADVERSE WIND EFFECTS

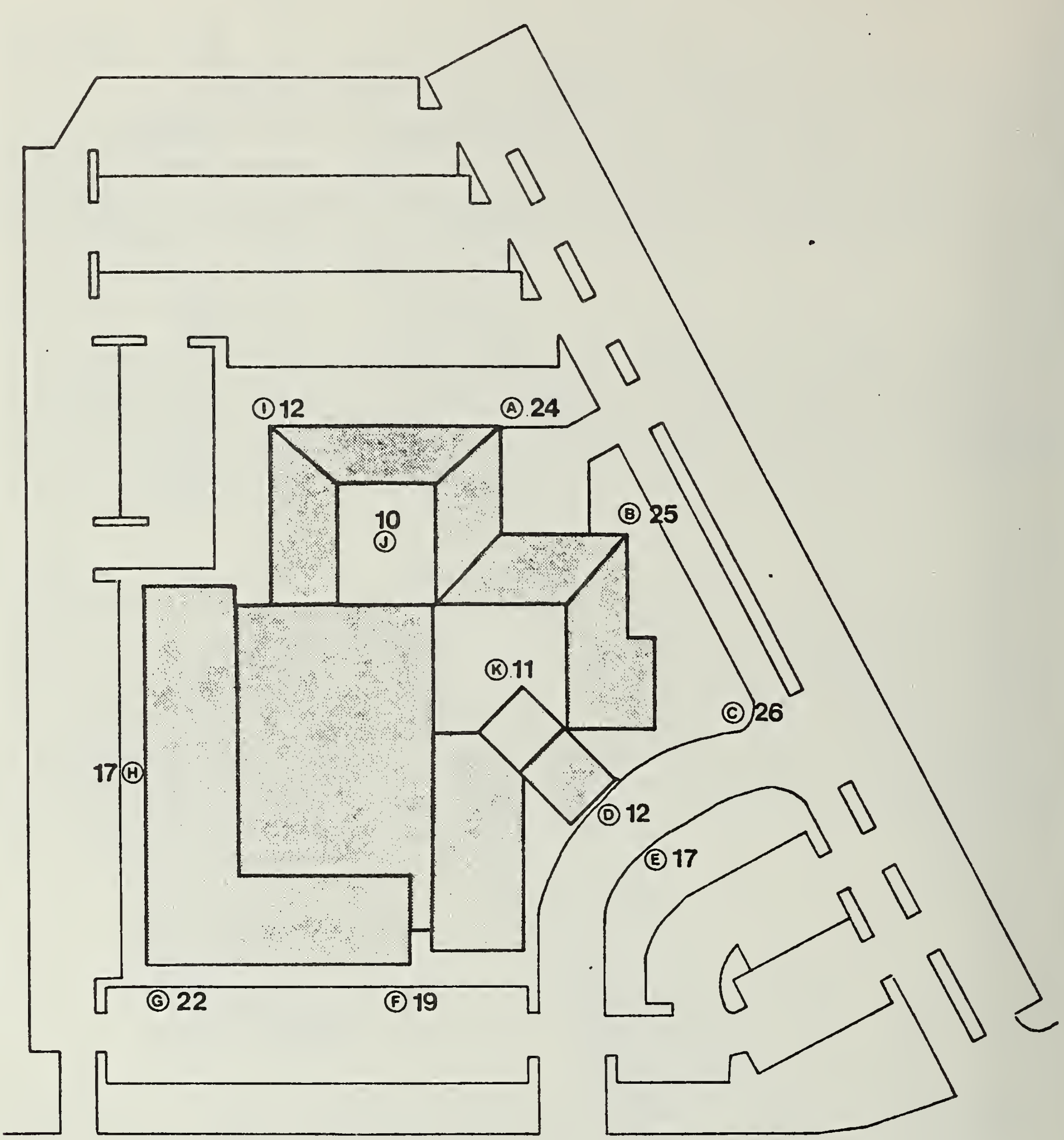
Measures to reduce winds and increase comfort can be developed at several scales, ranging from large-scale modifications of the project's grading plan to construction of small wind barriers in important areas. The following is a discussion of possible design modifications that would reduce winds and increase comfort, starting at the largest scale.

In considering these possible modifications, two factors should be considered:



PROPOSED SITE, AREA 1A
WIND STRENGTH INDEX
(SEE DEFINITION ON PAGE 49 VOLUME II)

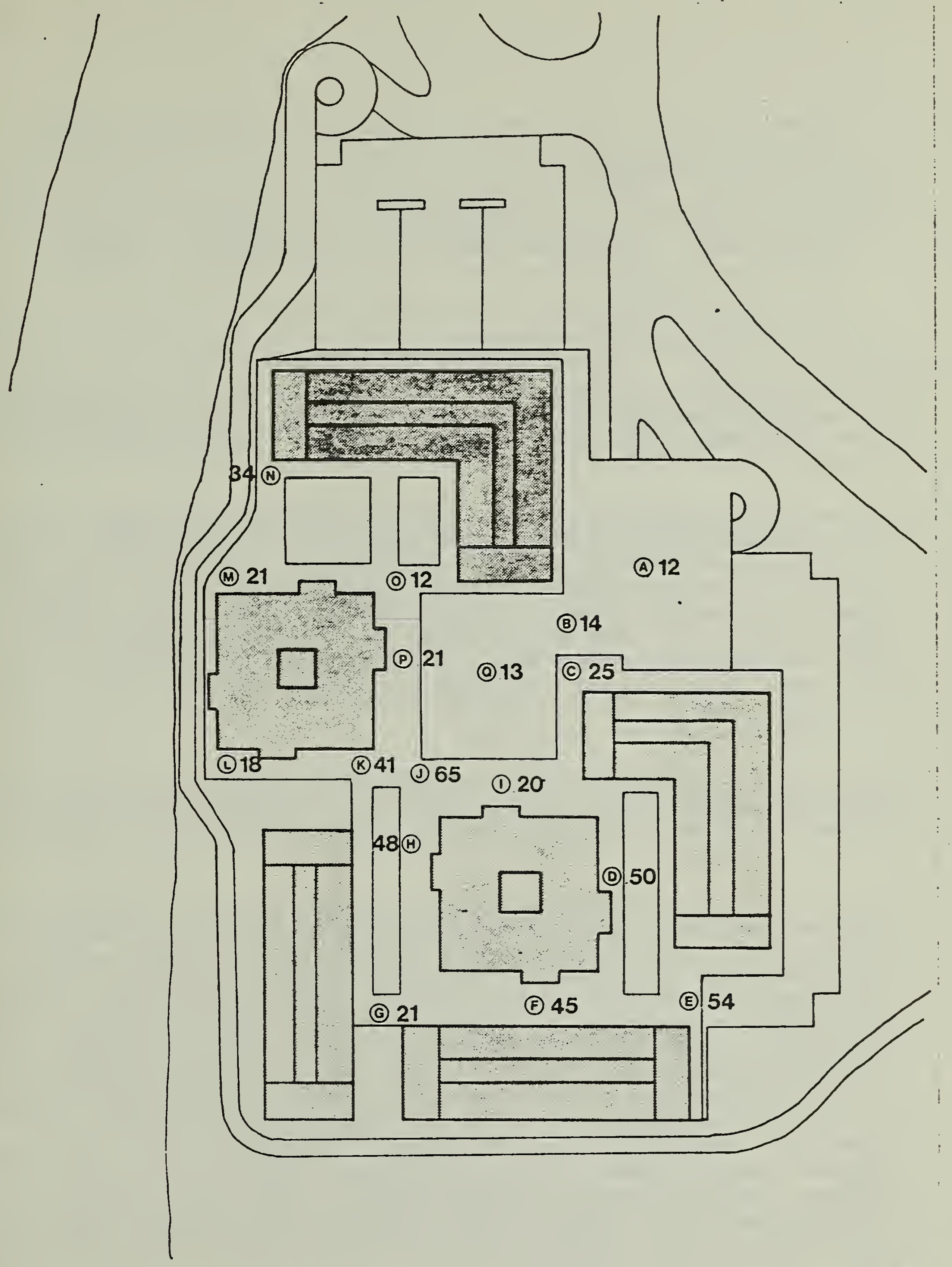
FIGURE B-4



PROPOSED SITE, AREA 2 WIND STRENGTH INDEX

(SEE DEFINITION ON PAGE 49 VOLUME II)

FIGURE B-5



PROPOSED SITE, AREA 3
WIND STRENGTH INDEX

(SEE DEFINITION ON PAGE 49 VOLUME II)

FIGURE B-6

- These measures are based on aerodynamic principles alone. Other factors such as cost, aesthetics, and access must also be considered.
- The effectiveness of each possible measure has not been quantified. The actual ability of a measure to reduce winds can be determined only by further experimentation in a wind tunnel.

A. MODIFICATIONS TO TOPOGRAPHY

The study of existing winds on the site showed that topography was an important factor in determining wind flows over the site; hence the potential for improving wind and comfort conditions by modifying terrain is large.

Of the many possible alternate grading plans, one sloping down from northwest to southeast would minimize wind problems. Avoiding structures on higher land would also decrease exposure to winds. The present grading plan places Areas 1A and 3 on generally elevated plateaus, an unfavorable position. Regrading to reduce exposure or increase terrain shelter would be possible, although costs and the amount of fill materials available could restrict the range of possible plans.

B. MODIFICATIONS TO STRUCTURES

A variety of building modifications can reduce exposure to wind. Building height, shape, bulk, width, orientation, roof design, surface treatment, and location with respect to other structures all affect winds.

The potential for improving winds at Area 1 appears limited because the design already incorporates several features that act to reduce winds. Within the complex of buildings itself winds are generally low, but some improvement could be expected with proper spacing of the structures. The outer areas of the site experience higher winds, but modifying the structures would not reduce these winds. The general east-west orientation of the structures and their location on unprotected plateaus result in generally moderate winds at Area 1A. Improving winds by lowering building heights is not possible nor would it be effective. Reorienting the buildings on a north-south axis would increase winds around the upwind buildings but would also increase shelter between the structures. The very open spacing of the structures promotes winds; bringing them closer together would mitigate this effect.

Area 2 is in a favorable position, having elevated terrain both to the north and west. This, together with its low-rise nature, results in low winds. Little mitigation is needed, and changes in building configuration would not be an effective method of mitigation.

There is a great potential for improving wind conditions at Area 3 through building modifications. The prime causes of high winds in this area are the two highest towers. In their present configuration the towers channel and accelerate northwesterly or southeasterly winds between them. Rotating these towers to orient the gap between them in another direction would improve wind conditions.

Eliminating or lowering the towers would greatly improve winds by reducing the volume of air intercepted by project structures. Provision of a "skirt" or canopy around the base of the towers would improve winds at this level but would have no effect on the high winds between the structures. It is also likely that different spacing and resiting of the structures could improve winds considerably. Locating the towers at a lower elevation, for example, at the south end of Area 3, would result in a lower effective height and less wind effect from the prevailing wind direction.

The shape of a tower also influences winds. Slab towers oriented with the small side to the prevailing wind would intercept less air and would therefore cause lower wind speeds.

C. LANDSCAPING

Landscaping is not an effective method of making major modifications in wind-flow patterns but is useful in creating local areas of shelter where needed. Provision of substantial vegetation would reduce winds throughout the site. To be most effective, vegetation should be dense and should extend from near ground level to at least 15 feet high. While any vegetation absorbs the momentum of the air and reduces winds, proper selection of plant type, height, spacing, and orientation is necessary to maximize the mitigating effect.

Provision of "wind breaks" or green belts, areas of dense trees and bushes, could be an effective aid in reducing winds. These should be oriented more or less north-south to provide protection from prevailing westerly winds and peak southeasterly winds (often associated with rain) while minimizing shadow area. The most favorable locations for these would have to be determined through wind tunnel tests; however, two areas appear appropriate for this technique. A shelter belt west of Area 3 along U.S. 101 would lessen the high winds that would be experienced in this area while visually screening the freeway. A shelter belt west of Area 1A would also have a beneficial effect on the moderate winds that would occur there.

Provision of earth berms, with or without vegetation, and hedges are often used to provide wind protection. These are most effective in furnishing local shelter along pathways, plaza areas, and waiting areas. Specific recommendations at this level of detail are not possible at this time.

VI. METHODOLOGY

A. MODEL AND WIND TUNNEL FACILITIES

A model of the existing site was constructed out of 1/4" cardboard pieces cut to the exact contours of the site and stacked in layers to form the site and surrounding area, including Bayview Hill.

A model of the proposed site was constructed in a similar fashion, with the layers cut to the new grading plan. The buildings in each area were made of polystyrene foam and placed on the site. The parking levels in Area 3 were also made from polystyrene foam. The model scale was one inch equals 40 feet. The contours for the existing and proposed site were taken from plans developed by the architect.

The Environmental Impact Planning Corporation boundary-layer wind tunnel was designed specifically for testing architectural models. The working section is 7 feet wide, 14 feet long, and 5 feet high. Wind velocities in the tunnel can be varied from 3.5 to 13 miles per hour. The flow characteristics around sharp-edged objects such as architectural models are constant over the entire speed range. Low speeds are used for photographing tracer smoke, high speeds for wind-speed measurements.

Simulation of the characteristics of the natural wind is facilitated by an arrangement of turbulence generators and roughness upwind of the test section. These allow adjustments in wind characteristics to provide for models of different scales and varying terrain upwind of the project site.

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Simulation of the characteristics of the natural wind is facilitated by an arrangement of turbulence generators and roughness upwind of the test section. These allow adjustments in wind characteristics to provide for models of different scales and varying terrain upwind of the project site.

Measurements of wind speed around the model are made with a hot-wire anemometer, a device that relates the cooling effect of the wind on a heated wire to the actual wind speed. The flow above the city is measured by a Pitot tube connected to a micromanometer, which together measure directly the pressure difference between moving and still air. This pressure difference is then related to the actual wind speed. Flow visualization is achieved by using floodlit smoke in conjunction with a 35-mm. camera.

B. TESTING METHODOLOGY

1. Simulation of Flow

The most important factors in assuring similarity between flow around a model in a wind tunnel and flow around the actual building are the structure of the approach flow and the geometric similarity between the model and the prototype. A theoretical discussion of the exact criteria for similarity is not included in this paper, but may be found elsewhere (Cermak et al 1966; Cermak and Arya 1970).

The variation of wind speed with height (wind profile) was adjusted for the scale of the model and the type of terrain upwind of the site. The profiles used were those generally accepted as adequately describing the flow over that type of terrain (Lloyd 1967).

2. Testing Procedure

The wind-flow characteristics of the site in its present state were investigated to ascertain the present wind environment. Wind speeds and directions at specified points throughout the site were measured and recorded. Wind direction was measured by releasing smoke at each point and recording the direction in which the smoke traveled. Wind speed measurements were made at the same points, at a scale height of five feet above the ground. A hot-wire anemometer probe was used to make these measurements within a fraction of an inch of the model surfaces. The probe was repeatedly calibrated against the absolute reading of a Pitot tube and micromanometer. Velocity readings close to the model were generally accurate within 10 percent of the true velocity.

A similar technique was used to measure the wind environment with the proposed buildings and grading scheme in place. Measurements were taken around the buildings and on adjacent areas.

Before and after each test run, a calibration measurement was made above the model in order to relate the wind tunnel measurements to actual wind records from U.S. Weather Service wind instrumentation located on the Federal Building at 50 Fulton Street.

3. Wind Strength Index

The wind at a given location, and the resulting level of comfort experienced, depend on several factors at different scales. On the local scale, terrain and building geometry affect wind strength and direction by blocking, channeling, diverting, deflecting, or accelerating winds. At pedestrian levels the wind pattern may be quite distorted even though the wind is from one general direction. This pattern of local winds will, of course, change as the general wind direction changes, so there is no one wind pattern that can be defined for a site.

Because the wind pattern at a site varies with direction, the frequency of each wind direction is very important. The importance of an extreme wind acceleration around a building corner under a north wind is greatly diminished, for example, if north winds occur only one percent of the time.

Both of the above factors are included in the derivation of the Wind Strength Index (WSI). The steps involved in computing the WSI are:

1. For each wind direction (in this case, the five most important directions), the strength of the wind is measured at every point of interest on the site.

2. At each point of interest, wind strength for each direction is weighted by the frequency of winds from that direction. To obtain the WSI, these values are summed and converted to percentages.

Use of the Wind Strength Index results in a single map that summarizes the wind measurements made for all wind directions. Based on WSI values computed for other areas of San Francisco, the plotted WSI values can be interpreted according to the following:

Wind Strength Index	Interpretation
0 - 20	Low winds
21 - 44	Moderate winds
45 - 70	High winds
> 70	Very high winds

The pattern of the Wind Strength Index represents the pattern of winds that would be experienced on the site over a long period of time (a year, for example). On any given day, of course, the actual wind pattern on the site could vary greatly from the WSI pattern. As a direct measure of average winds, the WSI is also a direct measure of the frequency of wind-caused discomfort. While a specific frequency of discomfort cannot be specified for a given WSI value, discomfort frequency is proportional to WSI.

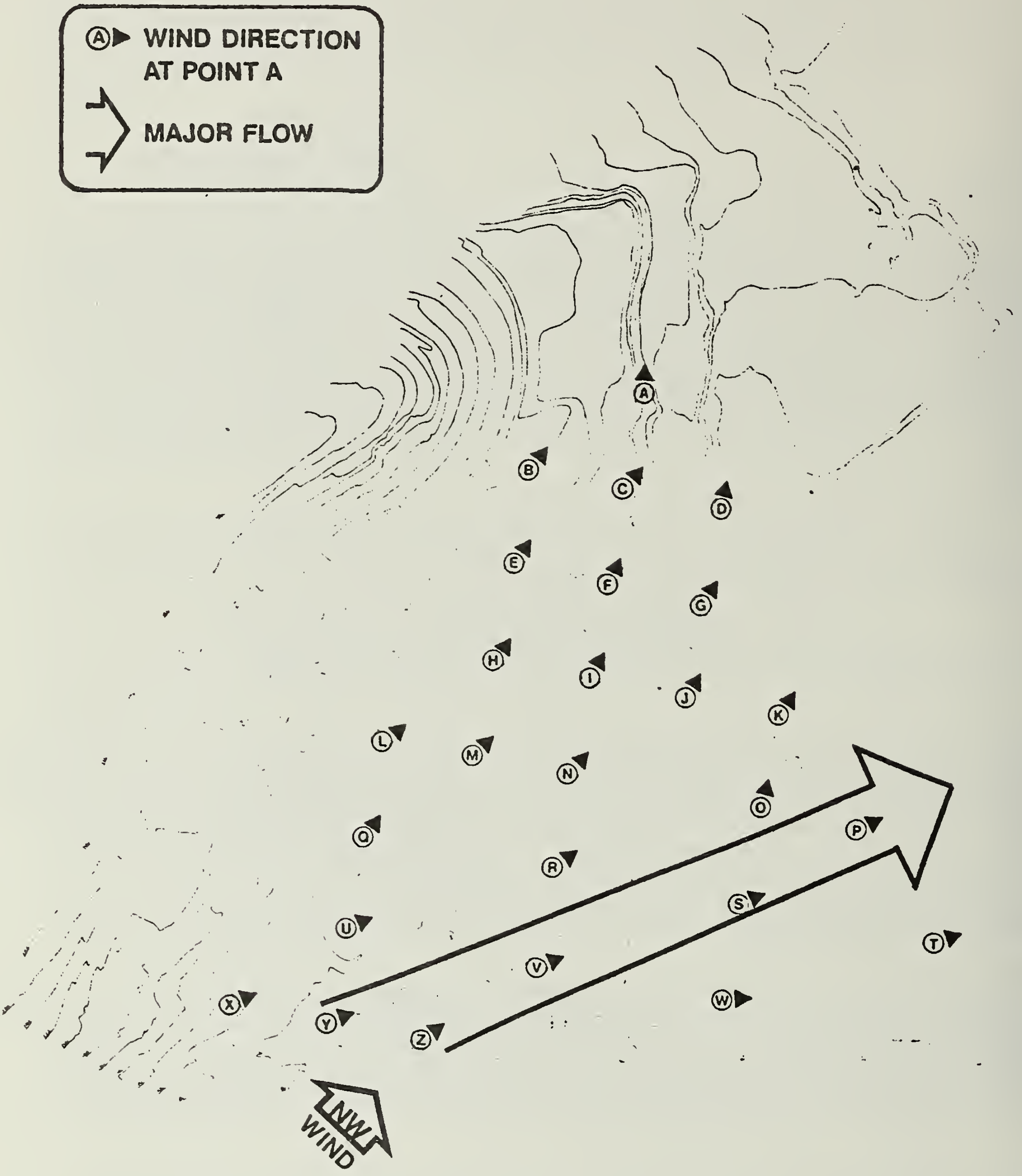
VII. TECHNICAL DATA AND DISCUSSION

The following is a discussion of wind conditions on the site for each wind direction investigated. Information on wind directions over the site is shown in Figures B-7 through B-16. Wind direction at each measurement point is shown. The major flow path over the site, when applicable, is indicated by a large arrow.

Individual wind speed measurement data is presented in Tables B-1 through B-6.

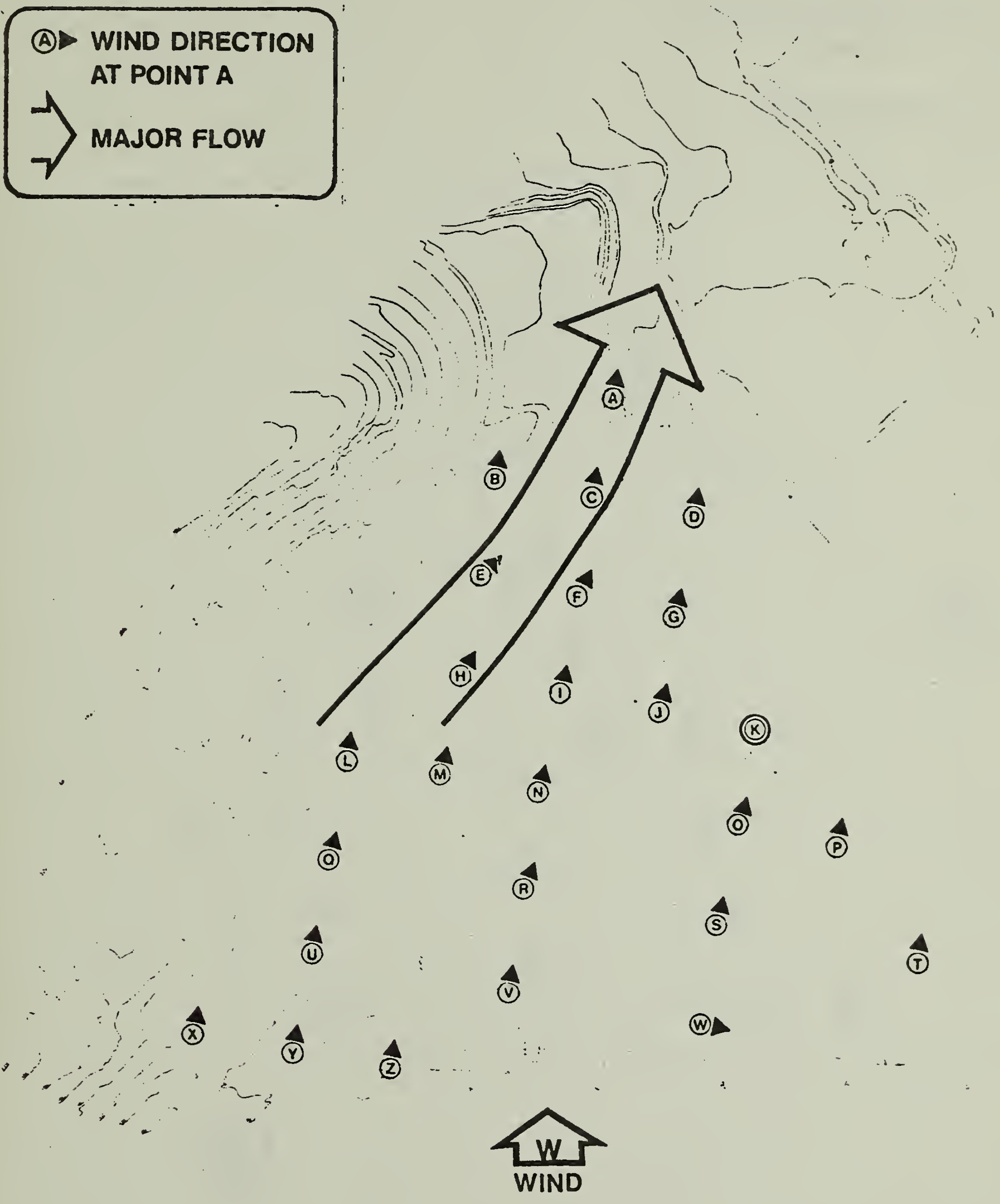
Measured wind speeds are expressed as percentages of the calibration wind speed, which corresponds to the actual wind speed at the San Francisco Weather Station. Thus a value of 0.52 means that the measured wind speed is expected to be 52 percent of the wind speed recorded by the Weather Service when winds are from that particular direction.

The values can be interpreted in terms of general "windiness" using the scale below. This scale is subjective and is based on information gathered from studies in San Francisco.



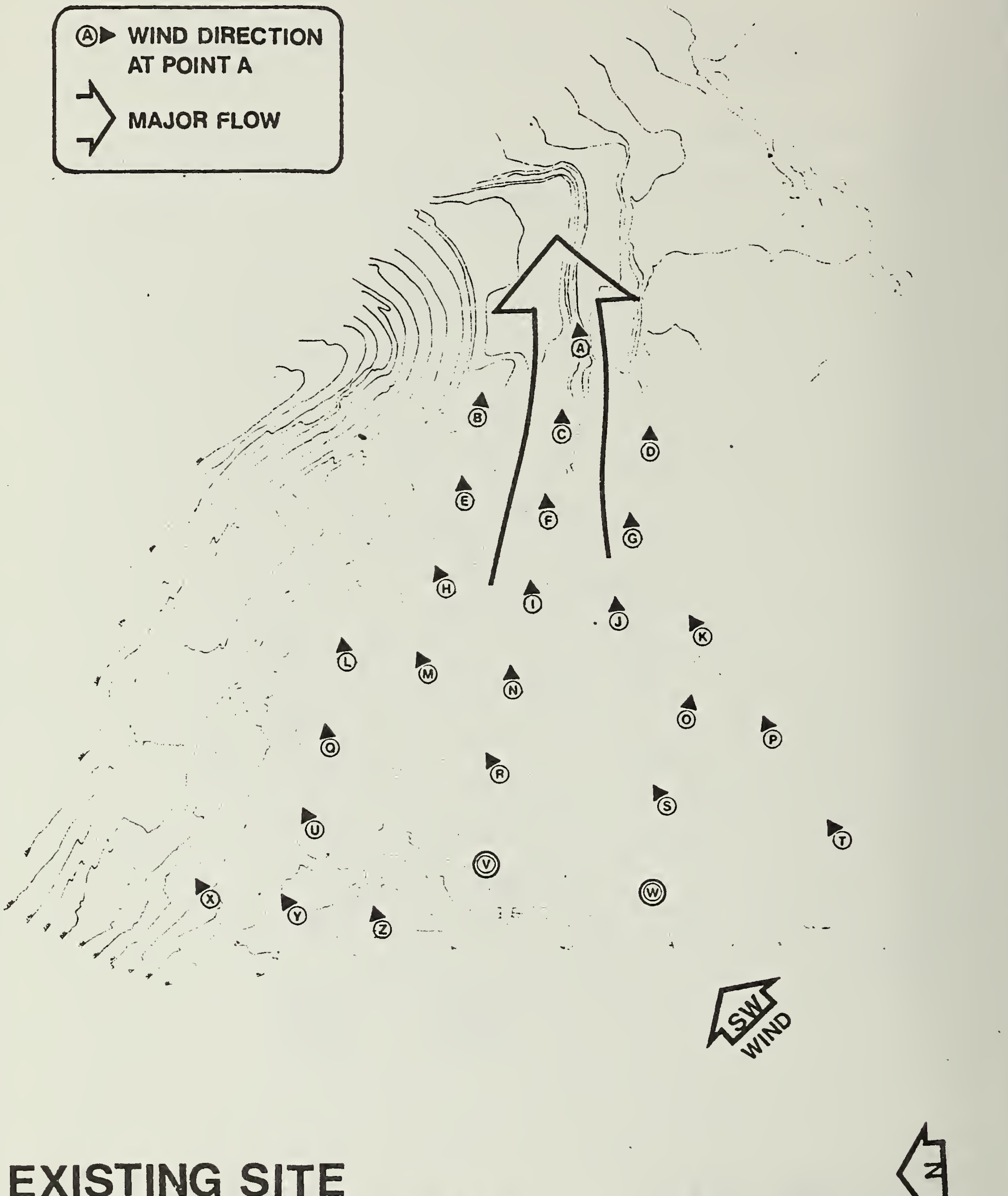
EXISTING SITE
WIND FLOW PATTERNS

FIGURE B-7



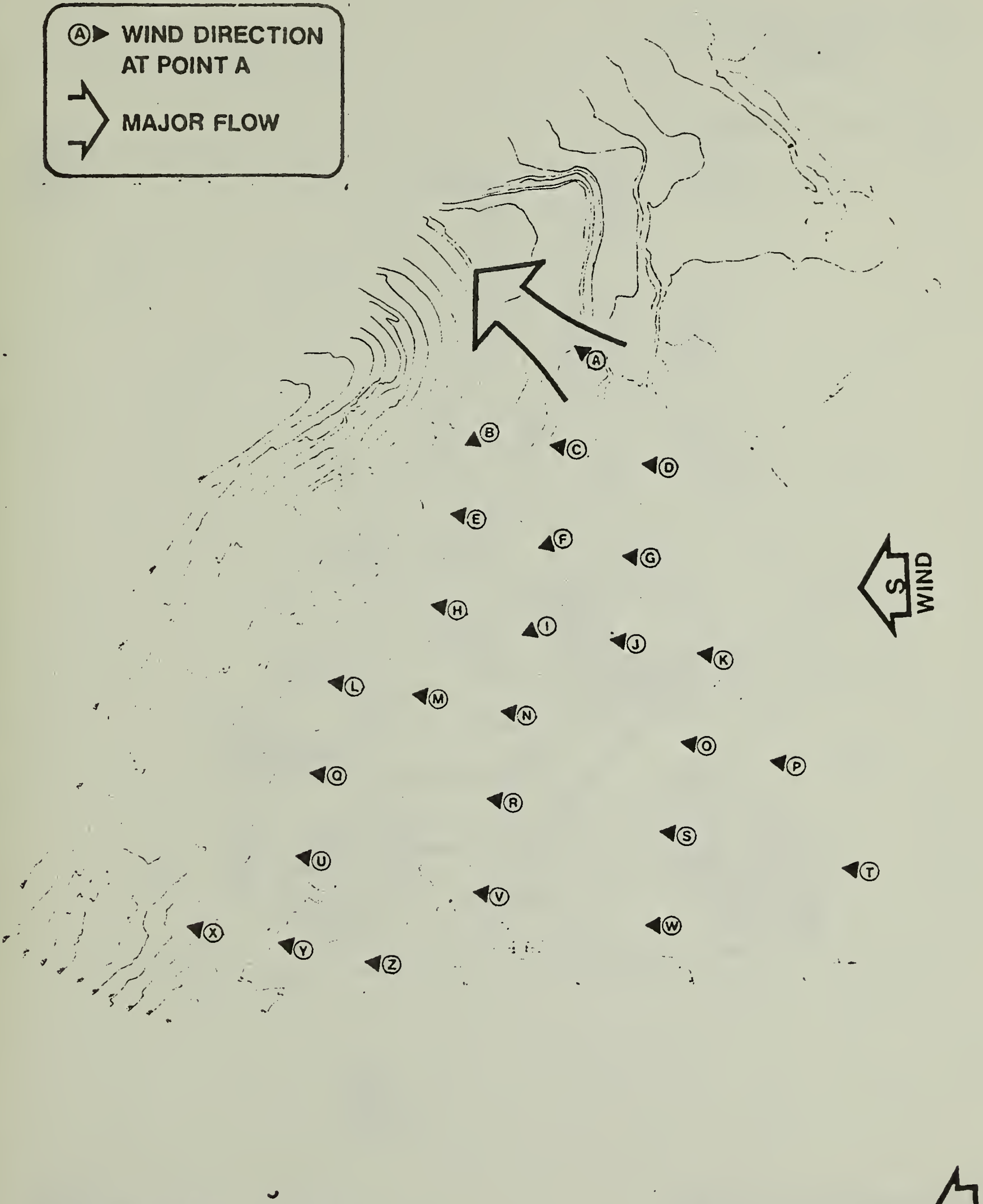
EXISTING SITE WIND FLOW PATTERNS

FIGURE B-8



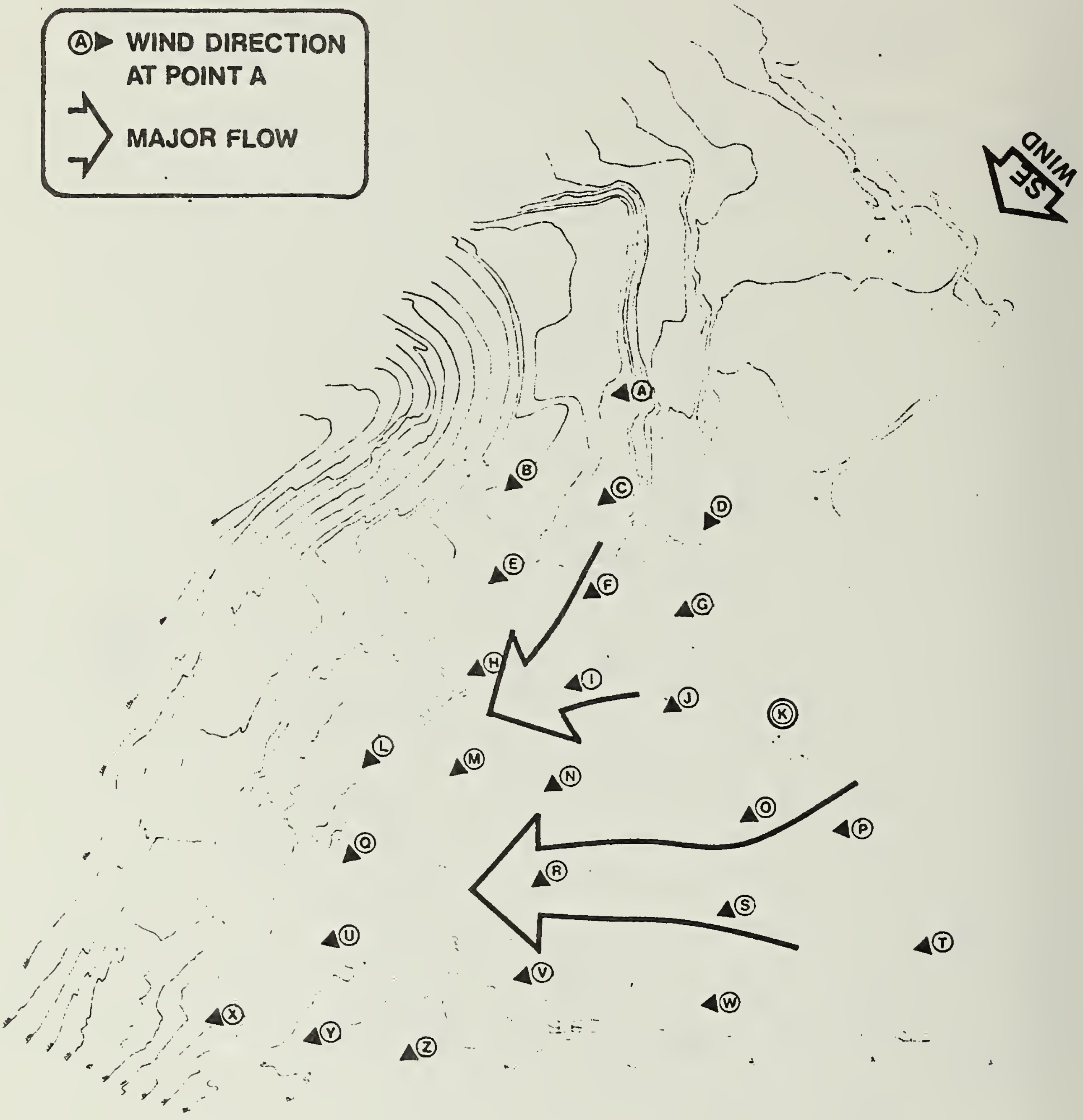
EXISTING SITE WIND FLOW PATTERNS

FIGURE B-9



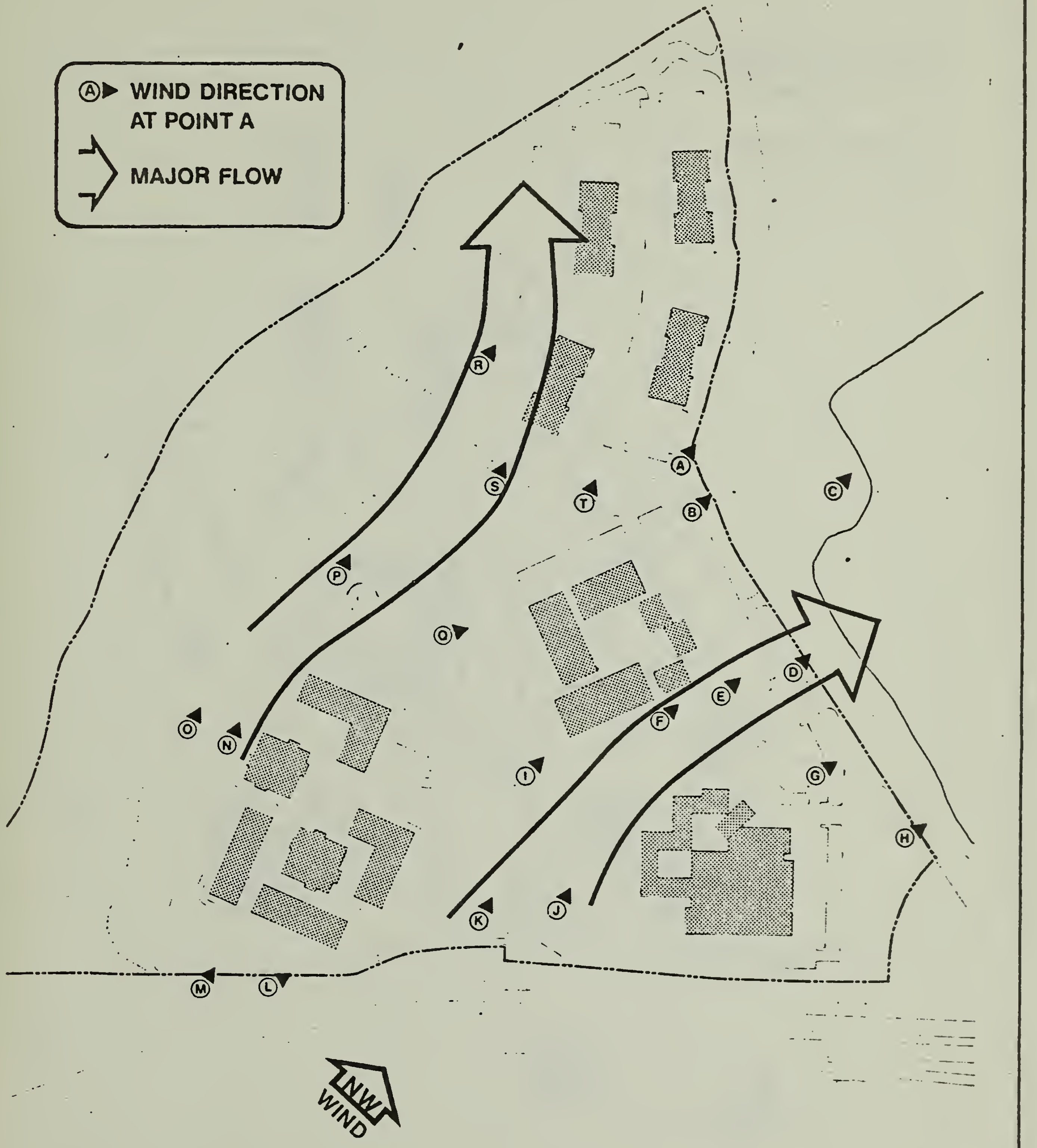
EXISTING SITE WIND FLOW PATTERNS

FIGURE B-10



EXISTING SITE
WIND FLOW PATTERNS

FIGURE B-11



PROPOSED SITE WIND FLOW PATTERNS

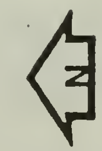
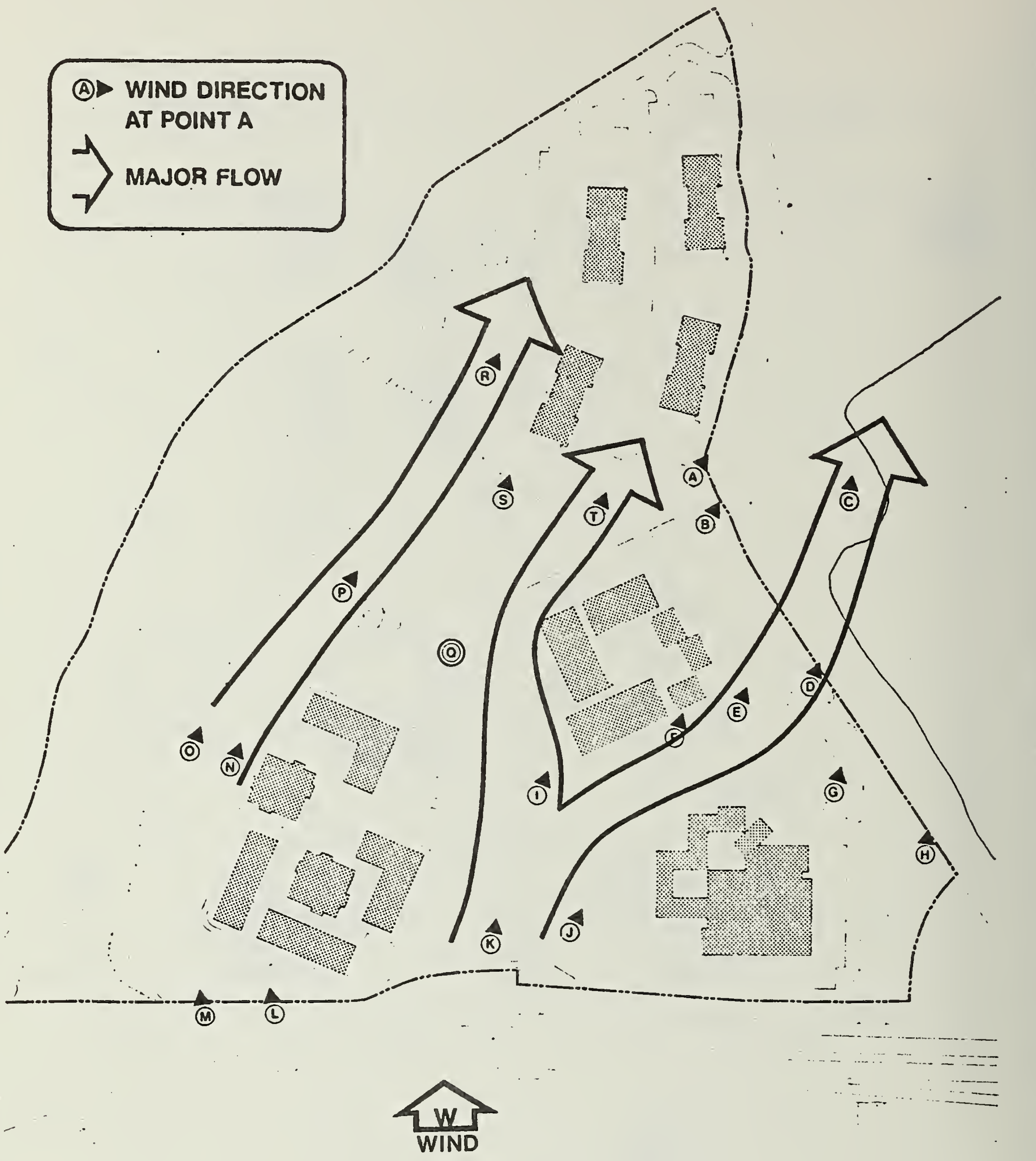
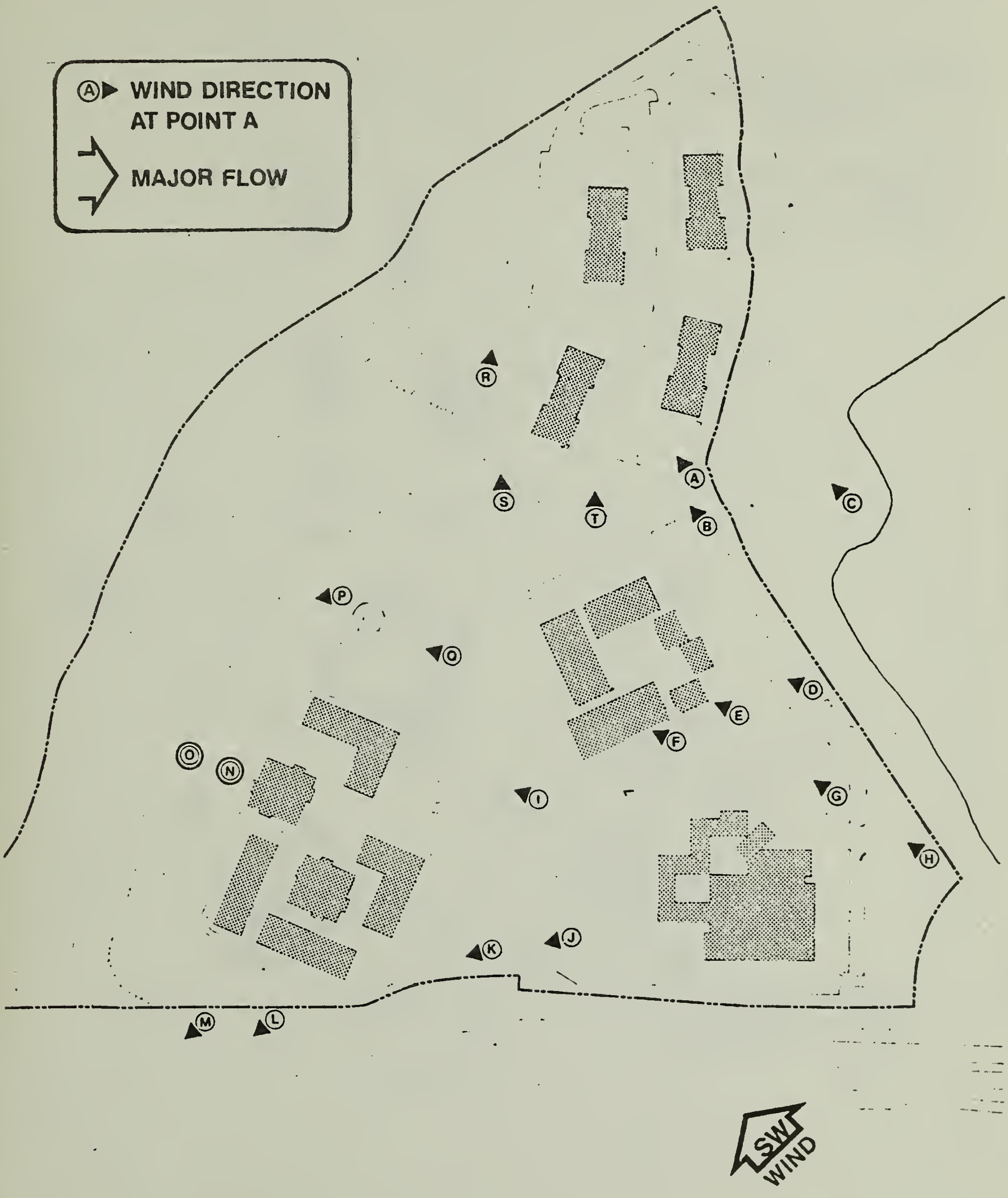


FIGURE B-12



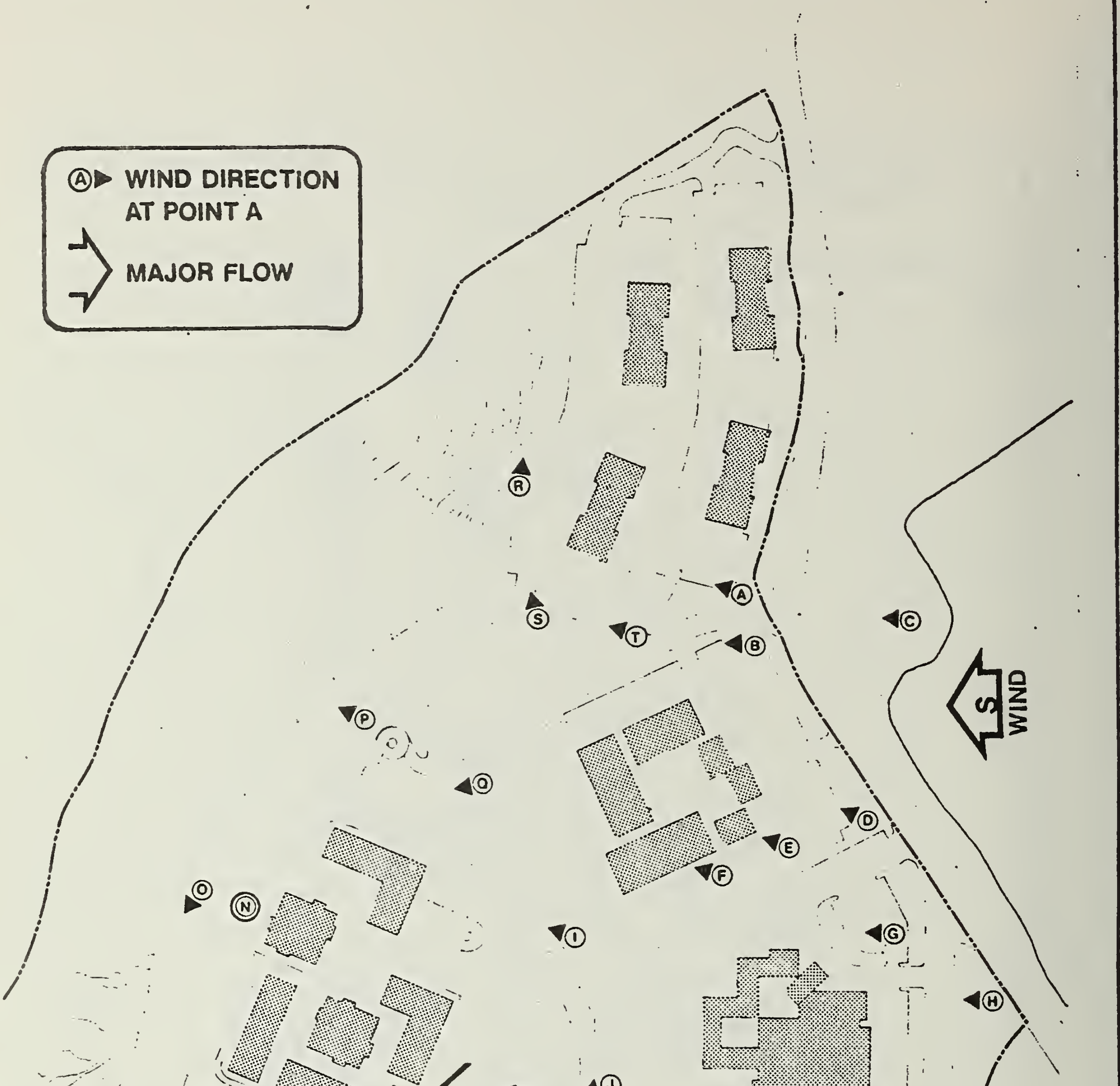
PROPOSED SITE WIND FLOW PATTERNS

FIGURE B-13



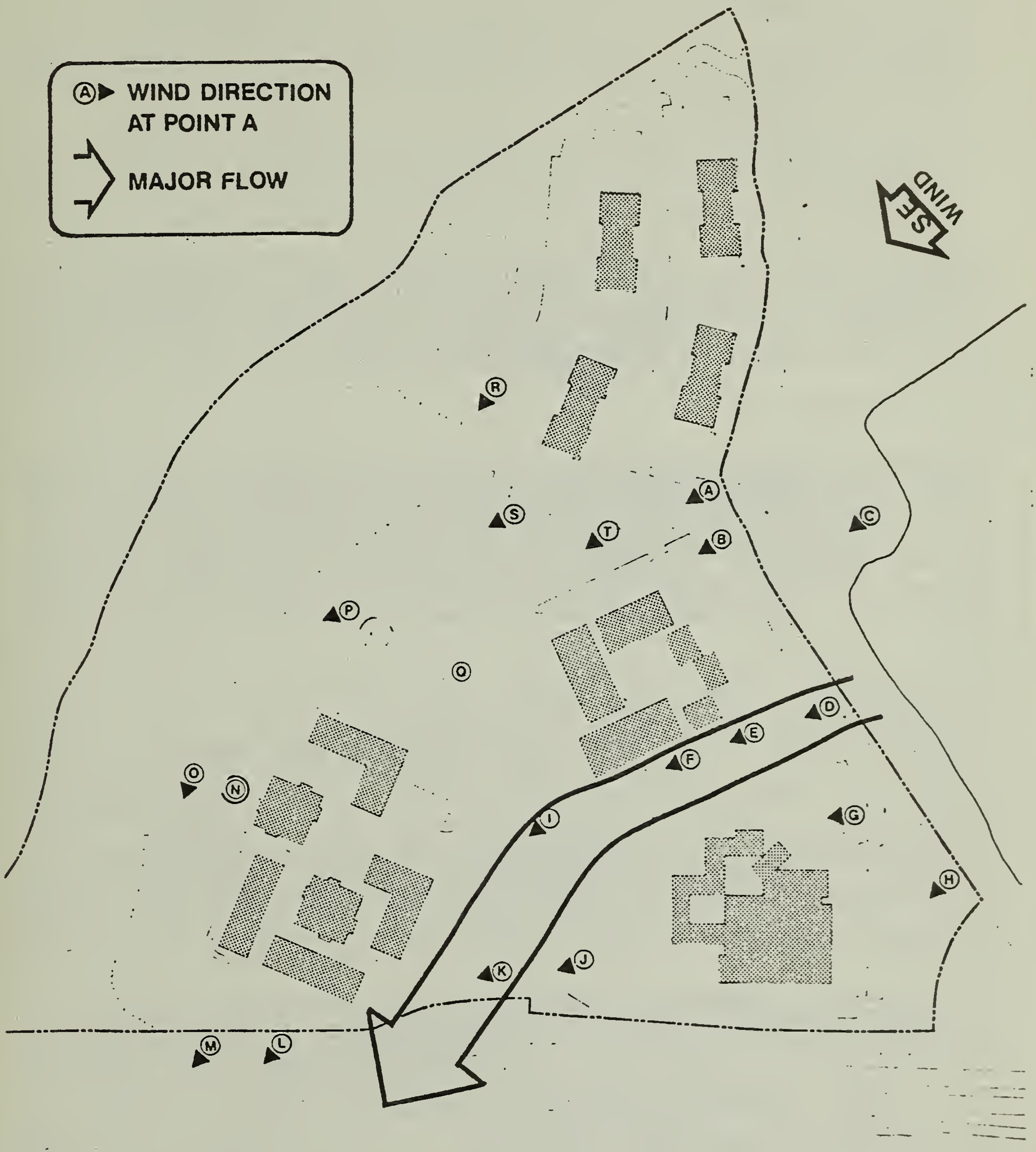
PROPOSED SITE WIND FLOW PATTERNS

FIGURE B-14



PROPOSED SITE WIND FLOW PATTERNS

FIGURE B-15



PROPOSED SITE WIND FLOW PATTERNS

FIGURE B-16

Velocity	Relative Wind Value
Low	0.00 - 0.19
Moderately low	0.20 - 0.29
Moderate	0.30 - 0.49
Moderately high	0.50 - 0.69
High	0.70 - 1.00
Very high	> 1.00

It should be noted that the plotted values are not actual wind speeds, but ratios. Thus a point having "very high" wind speeds would still experience light winds on a near-calm day. Likewise, a point found to have "low" winds could experience significant winds on an extremely windy day.

A. NORTHWEST WIND

Northwest winds occur 12 to 39 percent of the time in San Francisco, depending on the season. (In meteorology, a northwest wind blows from the northwest.) Northwesterly and westerly winds are the most frequent and strongest winds at all seasons in San Francisco. Northwest winds exceed 13 miles per hour 35 percent of the time and 25 miles per hour 3 percent of the time in summer. Wind frequencies and speeds are lower in spring, fall, and winter.

Existing Site

Northwest winds on the existing site are mostly moderate to high (see Table B-1). The major flow from the northwest is over the freeway and across the lowlands adjacent to the freeway (see Figure B-7). These winds are in the high velocity range. The area around point W is protected by the berm created by the freeway. Point K is protected by the overpass and has low winds. The slopes of Bayview Hill generally have moderately high winds.

Proposed Site

The major flow pattern through the site is disrupted by the building clusters. The major flow is split into two directions by Area 3 (see Figure B-12). This leaves the area downwind of Area 3 with low winds (see Point Q in Table B-2). The winds on the site are mostly moderate to moderately high.

Area 1 generally has low wind values. Point C has moderate values; however, it is generally sunny, making the area more comfortable. The inner courtyard has low wind values (Table B-3).

Area 1A has moderate to low wind values. Table B-4 shows that under northwest wind conditions Points J and M have moderately high wind values.

Area 2 has low to moderate wind values; the highest are along the northeast portion of the building. The inner courtyards, Points J and K, have low values (see Table B-5). The entrance at Point D has low wind values and receives morning sunlight.

Area 3 has low to very high wind values, the low values being in the lower areas around Points A and B. The high-rises create a funnel effect, which generates high values between the two towers at Point J. Point J has a relative wind value of 118 percent. Points E and N have high values.

B. WEST WIND

West winds occur 15 to 40 percent of the time, depending on the season. West winds exceed 13 miles per hour 29 percent of the time and 25 miles per hour 7 percent of the time in summer. Wind strengths and frequencies are somewhat lower in spring, fall, and winter.

Existing Site

Figure B-8 shows the major flow through the existing site. Points A, C, E, and H have high winds, in the 80 to 90 percent range. Point K is a turbulent area. Point W is protected by the freeway and has low winds.

Proposed Site

Again, the major flows are separated by the building clusters (see Figure B-13). Point Q is turbulent. Velocities in the major flows are in the 60 percent range or moderately high (see Table B-2). The high-rise at Point N creates high winds that are funneled between it and Bayview Hill.

Area 1 has moderate to moderately high values (see Table B-3); the moderately high value is at Point A. The inner courtyard has low to moderately low values.

Area 1A has moderately low to moderately high values. The entrances at Points B, F, I, and M have moderately high values and are in the shade.

Area 2 generally has low values. The two courtyards have low values (see Table B-5). The entrance at Point D has low values.

Area 3 has low to high values; again, the low-velocity areas are at Points A, B, and C. The high-value area is at Point D, where winds are funneled between the south high-rise and the building to its south. Point D would be in the shade, thereby increasing discomfort.

C. SOUTHWEST WIND

Southwest winds occur on an average of 9 percent annually in San Francisco. Winds are highest in winter, when they exceed 25 miles per hour 2 percent of the time.

Existing Site

Figure B-9 shows the southwest wind flows. Points U and W are turbulent areas. Point A has very high winds, at 128 percent (see Table B-1). Velocities on the east side of the site tend to be high. The site is generally sunny except during the late afternoon near the freeway.

Proposed Site

Figure B-14 shows that there are no strong flows through the site. Most of the winds are in the 30 to 40 percent range. Point F reaches 80 percent, which is considered a high wind. Points N and O are turbulent.

Winds in Area 1 are low to moderate under southwest wind conditions. The highest value is 38 percent at Point I, which would also be shaded during early morning hours, thereby increasing discomfort. Winds in the inner courtyard are low to moderately low, as shown for Points K, L, M, and N (see Table B-3). Points D, E, F, and G would generally be in the sun, increasing their comfort.

Area 1A has moderately low to moderate winds. The highest value is 46 percent at Point D, where winds are accelerated by the hill to its south. It would generally be in the sun, decreasing discomfort. Entranceways have low to moderate winds and would generally be shaded.

Area 2 has low to moderately low winds; the highest value is 28 percent at Points E and H. The entrance at Point D has low winds.

Area 3 has low wind values, with the exception of Point F, which has moderate winds (see Table B-6). Winds are forced between the south high-rise and the low building to its west, giving Point F a 42 percent value.

D. SOUTH WIND

South winds are infrequent except during winter storms, when moderate to strong wind is often combined with rain. They are expected to occur 12 percent of the time in the months of December through February, exceeding 13 miles per hour 1 percent of the time. During other seasons south winds are light and occur less than 3 percent of the time.

Existing Site

The major wind flow from the south is towards the northeast corner of the site (see Figure B-10). Point A has a value of 75 percent (see Table 1). Winds on the site are basically moderate, with values of 30 to 50 percent. The upper slopes, Points L and X, have moderately high winds.

Proposed Site

Figure B-15 shows that the major flow is forced around Area 3 and has moderately high values. Point F has a high value of 91 percent (see Table B-2). The rest of the site contains moderately low to moderate values.

Area 1 generally has low values for south wind (see Table B-3), the highest being 24 percent, which is moderately low. This occurs at Point I, which is on a corner. Points K, L, M, and N, in the inner courtyard, all have low values.

Area 1A generally has low values. A strong flow between the two upper buildings creates high values at Point K and moderate values at Point L. The entrances all have low wind values. Point K would generally be in the sun, thereby decreasing the effect of the wind on comfort.

Area 2 generally has low winds. The highest value is moderate at Point C. The entrance at Point D has a low value. The inner courtyards at Points J and K have low values (6 percent).

Area 3 has mostly moderate values (see Table B-6). Points F and H have high values because of the funneling effect caused by the high-rise and the lower buildings. Point F would always be in the shade, increasing discomfort.

E. SOUTHEAST WIND

Southeast winds occur less than 3 percent of the time in spring and summer and 6 percent in fall. They are generally light during these seasons. In winter they can be expected 17 percent of the time, with speeds over 13 miles per hour 10 percent of the time.

Existing Site

Figure B-11 shows the major flows on the existing site under southeast wind conditions. The winds at the site are moderately high to high. Table B-1 shows that all points within the major flows are high, the highest value being at Point P. Point K is turbulent.

Proposed Site

Figure B-16 shows the major flow through the proposed site. Most of the points in this major flow have high values. Point N, where the wind is funneled between the hill and the north tower, is very high at 105 percent (see Table B-2).

Area 1 has moderate winds from the southeast (see Table B-3); the highest value is at Point C, on a corner. The inner courtyard (Points K, L, M, N) has low values.

Area 1A has a wide range of values from low to very high. The entrances are low to moderately low. Again, wind flow between the two upper buildings creates high values. Point K has a very high value (102 percent) and Point J has a value of 92 percent (see Table B-4). Point K would generally be in the sun.

Area 2 has moderate to moderately high values; the two highest are B and C, both moderately high. The two inner courtyards have low values. The entrance, Point D, has a moderately low value (see Table B-5).

Area 3 has moderately high to very high values. Southeast winds are funneled by the two towers, resulting in very high values at Points H and K of 120 and 115 percent, respectively. Again, Points H and K would generally be shaded. The southeast wind is also funneled by the south tower and the low building to the west, resulting in a value of 112 percent at Point F (see Table B-6).

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TABLE B-1

Relative Wind Value Figures B-1, B-7 through B-12

Point	NW	W	SW	S	SE
A	.47	.94	1.28	.75	.59
B	.76	.79	.37	.19	.75
C	.72	.91	.72	.35	.56
D	.28	.59	.59	.26	.63
E	.50	.86	.43	.34	.69
F	.58	.83	.74	.60	.79
G	.61	.64	.74	.38	.69
H	.56	.96	.70	.53	.66
I	.49	.60	.70	.53	.81
J	.46	.66	.48	.26	.37
K	.06	.31	.28	.26	.29
L	.28	.76	.59	.60	.65
M	.54	.66	.30	.43	.60
N	.31	.57	.37	.43	.66
O	.72	.51	.52	.38	.29
P	.71	.54	.33	.35	.87
Q	.46	.63	.28	.38	.65
R	.64	.54	.44	.47	.76
S	.67	.41	.44	.43	.79
T	.56	.37	.35	.24	.78
U	.63	.59	.35	.49	.66
V	.53	.31	.24	.43	.57
W	.39	.10	.30	.41	.63
X	.85	.79	.41	.62	.84
Y	.60	.40	.30	.49	.60
Z	.18	.11	.13	.49	.60

TABLE B-2

Relative Wind Value — Figures B-2, B-12 through B-16

Point	NW	W	SW	S	SE
A	.38	.52	.30	.26	.62
B	.29	.34	.34	.26	.57
C	.52	.60	.40	.22	.70
D	.55	.59	.40	.28	.87
E	.54	.57	.62	.35	.73
F	.52	.57	.80	.91	.78
G	.32	.31	.38	.24	.62
H	.43	.38	.40	.26	.78
I	.38	.69	.58	.35	.65
J	.45	.12	.12	.11	.35
K	.70	.67	.36	.54	.90
L	.27	.47	.50	.39	.48
M	.48	.69	.42	.39	.33
N	.64	.76	.08	.30	1.05
O	.39	.50	.08	.31	.50
P	.48	.40	.58	.22	.58
Q	.13	.28	.36	.30	.48
R	.54	.62	.46	.19	.50
S	.55	.52	.34	.13	.42
T	.32	.67	.20	.15	.45

TABLE B-3

Relative Wind Value Figure B-3

Point	NW	W	SW	S	SE
A	.18	.64	.26	.11	.48
B	.09	.14	.12	.07	.30
C	.44	.19	.04	.22	.50
D	.18	.22	.10	.06	.18
E	.07	.09	.26	.13	.33
F	.18	.24	.20	.09	.45
G	.29	.41	.18	.15	.42
H	.25	.21	.18	.20	.30
I	.14	.40	.38	.24	.37
J	.14	.29	.06	.13	.37
K	.07	.12	.10	.15	.18
L	.18	.24	.08	.15	.17
M	.09	.07	.12	.15	.18
N	.20	.43	.28	.09	.12

TABLE B-4

Relative Wind Value Figure B-4

Point	NW	W	SW	S	SE
A	.16	.48	.12	.07	.25
B	.18	.52	.34	.09	.10
C	.11	.17	.28	.20	.12
D	.11	.21	.46	.06	.70
E	.34	.43	.34	.09	.32
F	.34	.62	.22	.07	.20
G	.16	.29	.38	.22	.18
H	.32	.35	.38	.15	.33
I	.41	.28	.12	.06	.25
J	.54	.48	.24	.09	.92
K	.07	.21	.40	.87	1.02
L	.27	.26	.28	.41	.25
M	.34	.57	.36	.09	.13
N	.57	.57	.12	.07	.32

TABLE B-5

Relative Wind Value Figure B-5

Point	NW	W	SW	S	SE
A	.34	.21	.12	.09	.20
B	.34	.16	.06	.17	.63
C	.38	.09	.18	.33	.60
D	.18	.07	.08	.07	.22
E	.14	.07	.28	.26	.45
F	.11	.28	.10	.09	.20
G	.36	.12	.08	.15	.42
H	.25	.10	.28	.13	.08
I	.13	.09	.26	.09	.05
J	.11	.09	.06	.06	.10
K	.14	.10	.06	.06	.18

TABLE B-6

Relative Wind Value Figure B-6

Point	NW	W	SW	S	SE
A	.11	.07	.12	.11	.37
B	.16	.07	.14	.17	.38
C	.41	.09	.12	.31	.48
D	.34	.74	.20	.31	.65
E	.89	.34	.18	.37	.73
F	.18	.48	.42	.81	1.12
G	.14	.19	.10	.37	.55
H	.34	.50	.10	.72	1.20
I	.11	.24	.22	.20	.35
J	1.18	.43	.16	.41	.38
K	.34	.33	.18	.65	1.15
L	.14	.21	.08	.19	.22
M	.25	.07	.18	.56	.50
N	.70	.07	.22	.34	.50
O	.07	.10	.18	.17	.35
P	.22	.24	.12	.09	.25
Q	.16	.10	.10	.13	.27

Appendix C

Transportation Report

SAN FRANCISCO EXECUTIVE PARK TRANSPORTATION IMPACTS

This analysis follows the City and County of San Francisco's Traffic Impact Checklist.

I. PROJECT DESCRIPTION AS IT RELATES TO TRANSPORTATION

A. 1. Location - Address, Block and Lot Number

The project is located on the southerly boundary of the City and County of San Francisco in the south Bayshore area immediately east of Highway 101 (Figure E-1). The property is Lot 58 of Assessor's Block Number 4991.

2. Street/Cross Street

The site of the proposed project lies between Highway 101 and Candlestick Park. Blanken Avenue crosses the site and Harney Way runs along its southern boundary. The Candlestick Park freeway interchange adjoins the southwest corner of the property. Just north of the interchange Alanna Way runs west from Harney Way under the freeway and connects to the northwest freeway off-ramp and the new extension of Beatty Road. Jamestown Avenue runs east of the project on the west side of Candlestick Park.

B. 1. Plan of Project Access to Existing Transportation - Transit, Streets, Bikeways, Pedestrian Ways

The principal access route is via the Candlestick Park freeway interchange. Blanken Avenue (the eastern portion on the project site is shown on some maps as McKinley Avenue) and Jamestown Avenue are the two secondary access streets. Blanken Avenue is three lanes as it enters the western portion of the project; at the first major parking area entrance on its north it widens to four lanes and remains four lanes to the Harney Way intersection.

There are five vehicular access points to the proposed project from Blanken Avenue, three from Harvey Way and one from Alanna Way (Figure E-2). Pedestrian access from the site to

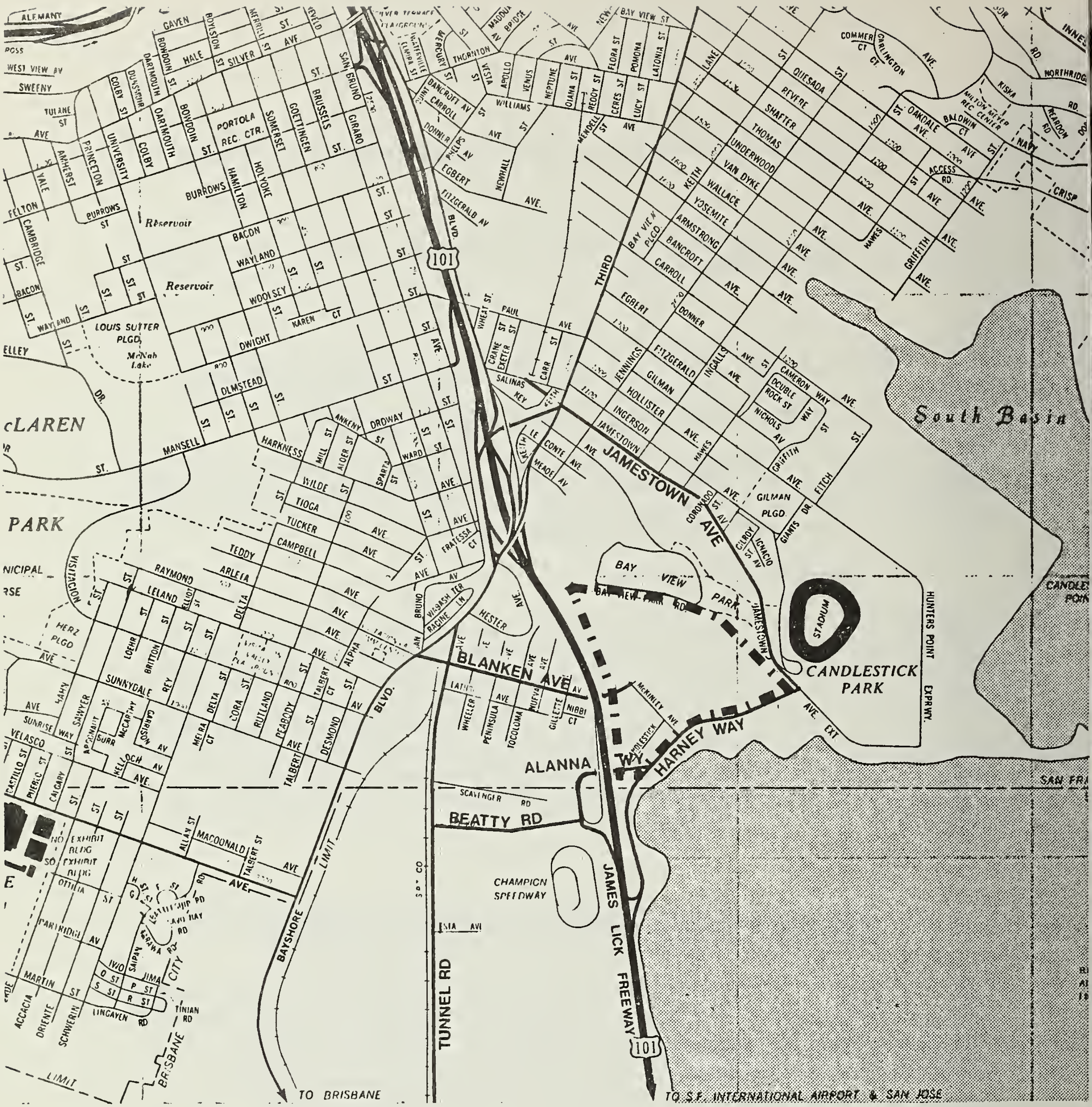


FIGURE E-1 LOCAL ACCESS MAP

NORTH

Blanken Avenue and Harney Way is at the same points as vehicular access. Jamestown Avenue is the only bicycle route near the project, and cyclists would reach the project area via Harney Way and Blanken Avenue. Municipal Railway bus route No. 29 terminates one block west of the site, at Blanken and Gillette Avenues. This local line connects with such major lines as the No. 15, which travels between City College and downtown San Francisco. The Southern Pacific Railroad's Bayshore Station is seven blocks from the site on the west side, and on the number 29 bus route.

C. 1. Plan of Truck Loading Area Showing:

a. Extent of curb cut.

There will be no curb cuts for truck loading.

b. Amount of red or yellow curb required.

No red or yellow curb would be required for truck loading.

c. Amount of area needed for maneuvering.

Only the hotel and restaurants would have loading areas for maneuvering, each location requiring about 500 square feet.

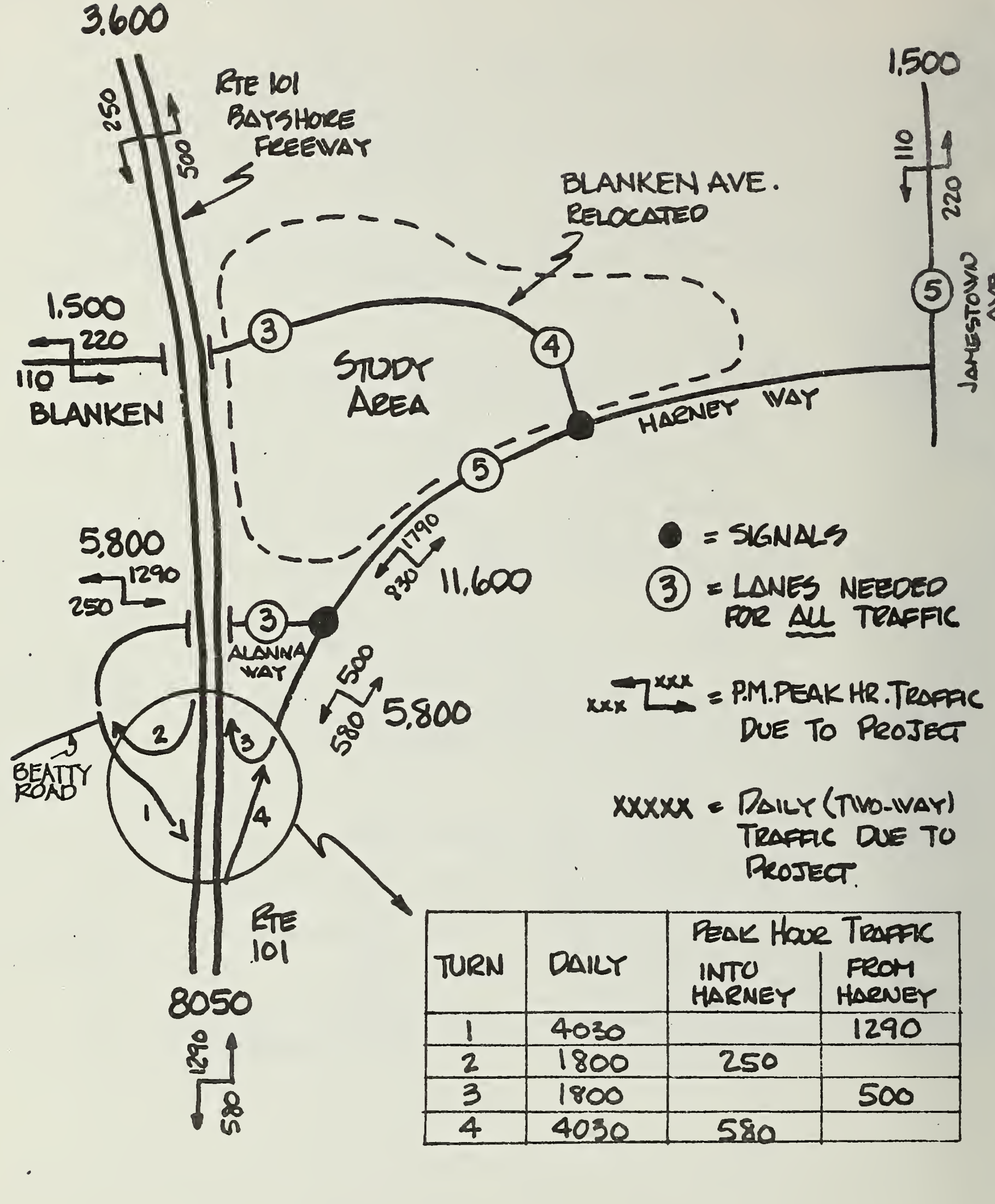
D. 1. Plan of Pedestrian Access Showing:

a. Amount of white or green curb required.

No white or green curbing is required.

b. Sidewalk width changes proposed.

All sidewalks would be standard: four feet wide; about 6,100 linear feet of sidewalk would be constructed.



TURN	DAILY	PEAK HOUR TRAFFIC	
		INTO HARNEY	FROM HARNEY
1	4030		1290
2	1800	250	
3	1800		500
4	4030	580	

FIGURE E-2 TRAFFIC CIRCULATION IMPACTS MAP

NORTH

E. 1. Plan Showing Changes in Street Right-of-way Characterists

The project would not change the street right-of-way characteristics. The additional lane on Blanken Avenue from the underground parking lot to the Harney Way intersection would be eastbound.

F. 1. Plan of Parking Facilities Showing:

a. Access/egress.

As mentioned in I.B.1, there are five access/egress points to the project from Blanken Avenue, three from Harney Way, and one from Alanna Way. The parking areas would be interconnected to allow sharing of spaces between adjacent areas.

b. Location and length of curb cuts.

Figure E-1 shows the location of all curb cuts. Each cut would average 28 feet.

c. Number of spaces proposed.

3,893 spaces are proposed; 4,120 spaces would be generated (see Table A-1).

2. Number of Off- and On-street Parking Spaces Displaced by this Project

Vehicles now park on the site during major events at Candlestick Park; however, there are no marked spaces to determine the number that may be displaced. Perhaps 400 to 700 vehicles park on the site when Candlestick Park is filled to capacity.

3. Method of Operation of Parking Facility

Parking would be free to users of the project, including employees, tenants, hotel and restaurant guests.

G. 1. Plan of Bicycle Parking Facilities

Areas 1 and 3 would have outdoor parking facilities for bicycles. Each area would accommodate 15 bicycles.

II. EXISTING CONDITIONS IN "SURROUNDING AREA"--DEFINED AS THAT AREA WHICH LIES WITHIN IN A 2-BLOCK RADIUS OF PROJECT, UNLESS OTHERWISE SPECIFIED.

A. 1. Transit Lines

The eastern terminus of Municipal Railway Bus 29 is at Blanken Avenue and Gillette near the freeway, one block west of the project site. It connects with major lines and stops at the Southern Pacific Railroad's Bayshore Station. The commuter train makes six stops daily, three in the morning and three in the afternoon.

2. Transit Preferential Streets

Bayshore Boulevard, about three-eights of a mile from the project, is the nearest transit preferential street.

B. 1. Major Thoroughfares

Highway 101 (James Lick Freeway) runs adjacent to the project. It is not designated in the Transportation Element of the San Francisco Comprehensive Plan as a major city thoroughfare. On normal days (i.e., days not including a special event at Candlestick Park), the freeway carries some 123,000 vehicles on nine lanes (four southbound and five northbound, uphill). During the afternoon peak hour (5:00 to 6:00) the freeway carries 5,600 vehicles southbound and is at about 70 percent of capacity (8,000 vehicles per hour is capacity). Northbound morning peak-hour volumes are higher as traffic moves uphill and is slower, reaching 6,500 vehicles per hour, or about 80 percent capacity (CalTrans Traffic Counts, 1974). Caltrans plans a sixth northbound lane but no funds have yet been appropriated.

2. Secondary Thoroughfares

None.

3. Recreational Streets

Harney Way, running from the Candlestick Park interchange east to Candlestick Park and Jamestown Avenue, running north from the southern tip of Candlestick Park past the west side of the park to Third Street; Blanken Avenue connects Harney Way, 200 feet north of Alanna Way, to Old Bayshore Boulevard west beyond the Little Hollywood residential area. It is not designated as a recreational street in the Comprehensive Plan.

TABLE E-1

Executive Park
Parking Spaces Needed

Land Use	1,000 Sq. Ft.	Spaces per 1,000 Sq. Ft.	Product	Shared Percent	Needed Parking Spaces
Office	863.640	3.3	2,850	--	2,850
Hotel	110.0	2.5	275	--	275
Restaurant/Convention	63.888	15.0	958	30[1]	670
Restaurant	14.4	8.0	115	30	80
Shop	61.4	5.0	307	20	245
Total			4,505		4,120[2]

Source: ENO Foundation of Transportation, Zoning, Parking, and Traffic. Saugatuck, Conn. 1972.

[1] Assumes lots are interconnected between Phase 1 office and Phase 2 convention center.

[2] 3,893 spaces are indicated on the plan. The restaurant has 98 of these and the hotel and restaurant/convention area 505. The rest are at office and shopping sites.

B. 4. Street Right-of-way Characteristics - Direction of Flow; Number, Width of Lanes; Sidewalks

Three of the four single-lane freeway ramps connect directly to Harney Way through two traffic lanes. The southbound off-ramp connects to only one eastbound lane through the Alanna Way underpass of the freeway. Harney Way is a five-lane arterial to candlestick Park; three lanes are westbound and two lanes eastbound on non-event days. When a major event is held at Candlestick Park, all lanes on Harney Way are inbound for pre-event and outbound for post-event traffic. Two of Blanken Avenue's three lanes are westbound and one eastbound. Jamestown Avenue's five lanes are reversible before and after stadium events. Trucks are not allowed on Blanken Avenue and Jamestown Avenue.

Existing traffic volumes on Harney Way and Blanken and Jamestown Avenues average two to three thousand cars per day per street (Table E-2). These volumes are well below the streets' capacities, although any volume through a residential neighborhood (i.e., Little Hollywood) is undesirable.

On days of major events at Candlestick Park a single hour's volume on Harney Way or Jamestown Avenue may reach two or three thousand vehicles.[1] The highest hourly volume recorded for Blanken Avenue was 1,272 vehicles (on Sunday, September 12, 1972, 10:00 to 11:00 a.m.; count by San Francisco Traffic Department); the count was made shortly before the Candlestick Park interchange at Highway 101 was opened. Usage of Blanken Avenue has decreased since the interchange was constructed. Up to 2,000 vehicles have been counted in one hour using the southbound on-ramp.

Baseball and football games (the most common events at Candlestick) vary in the traffic demands they place on the roads near the project site. Weekday baseball games are usually finished by 3:00 p.m., before the commute period, unless extra innings are played, or under special circumstances, such as playoff games. Double-headers are played on weekends.

Football games are generally played on Saturday and Sunday, although Monday night games are held once or twice a season. A smaller percentage of baseball spectators arrive from the south (40 percent) than football spectators (63 percent). Sunday crowds have been noted to require the following amounts of time to clear after games:

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[1] Information on Candlestick stadium traffic is from conversations with Richard Evans, San Francisco Traffic Department.

Crowd Size	Minutes to Clear Traffic
40,000	32
46,000	53
47,000	55
50,000	90
50,000 with rain	120

Monday night football games have created special problems for Blanken Avenue. While 2.7 is the average auto occupancy for weekend football games, occupancy drops to 1.9 on Monday night. Up to 2,000 autos in excess of parking capacity at Candlestick have been observed to arrive for these games. At these times, cars using the northbound off-ramps are routed away from the park via Blanken Avenue. These occasions are the only times Blanken Avenue is needed for handling Candlestick Park traffic, since the freeway interchange and routes on Alanna and Harney Ways and Jamestown Avenue can accommodate other park traffic. If the new extension of Beatty Road continues across the railroad tracks to Old Bayshore Boulevard, Blanken Avenue may not be needed for any Candlestick Park traffic. This extension could serve as the outlet for all overflow traffic. Both the extension and a new freeway interchange at Sierra Point (on the James Lick Freeway due East of Brisbane), to which the extension would connect, are under study by the City of Brisbane and Caltrans and may be built in the next two to five years (no funds have yet been appropriated).

C. 1. Existing Number of Off-street Parking Spaces

There are no marked parking areas on the site. During major events at Candlestick, vehicles park on part of the site and may number 400 to 700 for a capacity crowd.

C. 3. Location, Number of Spaces of Red, Yellow, White, Green, and Truck Loading Zones.

None.

TABLE E-2

Executive Park
Existing and Projected Traffic

Existing	Average Speed[1]	Volume[3] Existing 2-Way Daily	Volume[3] Existing P.M. Peak Hour Southbound (5:00-6:00)	Volume[3] Due to Project 2-Way Daily[4]	Volume[3] Due to Project P.M. Peak Hour In	Volume[3] Due to Project P.M. Peak Hour Out
Route 101 north	50	123,000	NA	3,600	250	500
Route 101 south	55	123,000	5,600	8,000	600	1,300
Harney Way (west of Blanken)	30	3,000[2]	NA	11,600	850	1,800
Blanken (west of 101)	25	2,000[2]	NA	1,500	100	200
Jamestown	25	2,000	NA	1,500	100	200

Sources: Caltrans, Traffic Volumes on California state highways, 1974; San Francisco Traffic Department.

[1] Estimated speed.

[2] Estimated average of all days.

[3] Estimated 5 percent of daily volume is trucks.

[4] Vehicles included in traffic count may pass one or more routes, e.g., some of the 8,000 vehicles southbound on 101 may be part of the 11,600 vehicles projected on Harney Way.

NA = Not Available.

C. 4. Location of Towaway Zones--Number of Spaces Displaced

Parking restrictions apply to Blanket Avenue during major Candlestick Park events.

D. 1. Existing Bicycle Routes

A bicycle route runs along Jamestown Avenue south of the Candlestick Park parking lot.

2. Streets Designated as Bicycle Routes

Jamestown Avenue.

III. DISTRIBUTION OF VARIOUS TRANSPORTATION MODES

			Estimates					
						Off-Peak		
			24-Hour	A.M. Peak 7-9	P.M. Peak 4-6	Day 10 A.M.-3 P.M.	Night 7 P.M.-6 A.M.	Candlestick Park Special Event
Transit Ridership	1.	Existing on each line in area (1-way) #29[1]	50	10	10	20	10	None
	2.	Capacity of each line in area (1-way) #29[2]	1,700	200	200	500	500	None
	3.	Trips generated by project (1-way, in)	300	200	20	50	10	None
Traffic Counts (Autos) Blanken	1.	Existing counts (1-way)[3]	1,000	200	200	500	100	1,300/hour
	2.	Capacity of street (1-way)[4]	6,000	1,600	1,600	3,000	3,000	1,500/hour
	3.	Trips generated by project (1-way, in)[5]*	750	400	400	200	100	--
Traffic Counts (Autos) Harney	1.	Existing counts (1-way)[3]	1,500	200	200	1,000	200	4,000/hour[6]
	2.	Capacity of street (1-way)[4]	20,000	4,000	4,000	8,000	8,000	4,000/hour
	3.	Trips generated by project (1-way)[5]*	5,800	3,000	3,000	1,500	500	--
Bicycle Counts	1.	Trips generated by project, total (1-way, in)[6]	30	20	0	10	0	
Pedestrian Counts	1.	Trips generated by project, total (1-way, in)[6]	100	50	10	20	0	

*For commercial facilities. This includes both employees and clients.

[1] End of line.

[2] Estimates based on Muni schedule.

[3] Estimates, see Table E-2.

[4] Multi-hour capacity depends on hourly distribution of demand. Figures are academic.

[5] See Table E-3 for total trip generation. Trip generatio rates are given in Table E-4. Peak period volume is for the heaviest direction.

[6] Rough approximations.

TABLE E-3

Executive Park
Trip Generation

	Trip Ends											
	Daily Two-Way				P.M. Peak Hour							
					In				Out			
Land Use Type	1A&1B	1C	2	3	1A&1B	1C	2	3	1A&1B	1C	2	3
Office	9,500	7,282	0	0	173	132	0	0	1,382	1,059	0	0
Hotel	1,100	1,015	0	0	33	304	0	0	33	30	0	0
Restaurant/ Convention	1,278	1,760	0	0	639	880	0	0	639	880	0	0
Restaurant	720	0	0	0	72	0	0	0	43	0	0	0
Shop	2,456	0	2,456	0	153	0	153	0	153	0	153	0
Residential with School	0	0	4,200	0	0	0	350	0	0	0	140	0
Light Industry	0	0	0	1,941	0	0	0	65	0	0	0	323
Open Space	--	--	--	--	--	--	--	--	--	--	--	--
Total	15,054	10,057	6,656	1,941	1,070	1,316	503	65	2,250	1,969	293	323

Note: Trip generation rates are shown in Table E-4.

IV. ENVIRONMENTAL IMPACTS (WITHIN A 2-BLOCK RADIUS AND BEYOND)

A. 1. Impact on Transit Ridership

The No. 29 Muni bus line currently estimated to be carrying ten peak-period riders at its terminus near the site, is projected to carry 200 additional riders for each peak period (about 600 additional riders during a 24-hour period).

2. Impact Due to Conflict with Operation of Existing Transit

The projected riders equal approximately the capacity of the existing service at the eastern terminus and would cause an excess over available capacity throughout the remainder of the line.

B. 1. Impact on Street System Due to Increased Traffic Load Generated by the Project

As detailed in column 1A of Table E-3, the project is estimated to generate 15,000 two-way vehicles per day (trip ends). During the hour of most travel, 5:00 to 6:00 p.m., about 1,100 vehicles would arrive (primarily for restaurant, hotel, and convention uses) and 2,250 would leave (principally office workers). Of those leaving in the peak hour (Table E-2), about 1,300 would travel the freeway southbound, 1,800 Harney Way westbound, 200 Blanken Avenue westbound, and 200 Jamestown Avenue westbound. The route of travel was predicted from travel time and distance measurements along three access routes--the freeway interchange (including Harney and Alanna Ways) and Jamestown and Blanken Avenues. Earlier research has shown that once people are familiar with the alternatives, they will choose travel routes according to the "Net Load Distribution Curves" shown on the last page. The travel time and distance measurements were applied to these curves to predict the travel routes of project generated vehicles. These figures were also compared to data generated for two other projects in the area: the staff report for the San Bruno Mountain Project, prepared by the San Mateo Planning Department in June 1975, and the Brisbane Marina Draft EIR, prepared for the Brisbane Planning Department by ESA in 1975. Of the 200 estimated vehicles to use Blanken Avenue from the project during the afternoon peak hour, about 100 are considered destined to the Leland Avenue commercial area or to homes in the general vicinity. (Note: the same vehicles may be counted more than once as they travel from Harney way to the freeway, i.e., vehicles are counted for each street; thus the sum of the street counts exceeds the total trip generation.)

The project traffic would bring the freeway from its current volume of 70 percent to about 85 percent of capacity in the afternoon peak hour (1,300 + 5,600 = 6,900 = 85% of 8,000 capacity). Since northbound morning peak-hour freeway volumes are higher than southbound volumes in the evening, the project would bring the northbound freeway to near capacity (about 7,500 vehicles per hour) in the morning.

Harney Way, with three lanes operating westbound and two eastbound, would be at about 75 percent capacity for afternoon traffic (1,790 = 75% of 2,400 capacity) and 77 percent capacity for morning traffic (1,200 = 76% of 1,600 capacity). Blanken Avenue's two westbound lanes would be at about 20 percent of capacity (220 = 20% of 1,100 capacity). In the morning peak hour, the single eastbound lane would be at about 30 percent of capacity (200 vehicles = 29% of 750 capacity).* Blanken Avenue would remain a three-lane street within the project area as far east of the freeway as the first major parking area entrance. To accommodate the vehicles entering parking access/egress from Harney Way, Blanken would be four lanes wide from the first major parking area to Harney Way with left-turn lanes added at driveways and the Harney Way intersection. Jamestown Avenue would have the same volume of traffic north- and southbound as Blanken would have west- and eastbound.

The capacities of other streets on or near the project (Harney Way, Alanna Way, and Jamestown Avenue) would be adequate with the exception of two or three days per year, when major events at Candlestick Park could be expected to overlap with afternoon commute traffic generated from the project, resulting in severe congestion. Traffic signals would be required at two intersections: Alanna Way/Harney Way and Blanken Avenue/Harney Way.

If the project were located in central San Francisco, some 40 percent of the employees could be expected to arrive by transit. Since most of the project's parking and most of its traffic are generated by the office facilities, much less parking would be needed with a downtown site since transit systems are more convenient and all-day parking is limited. A greater percentage of the employees at the project, however, are expected to drive due to limited transit, adequate parking, convenient highway access, and the distance most employees would live from the project (more than a radius of 15 minutes).

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*Improvements to facilitate traffic flow at Tunnel Road intersection may be necessary (eg. strip markings, street widening, etc.)

B. 2. Impact on Neighborhood Streets

As mentioned in B.1., the project-generated traffic would primarily use Highway 101. The 3,000 vehicles generated by the project on Jamestown and Blanken Avenues represent 20 percent of the project total; however, the 1,500 vehicles traveling on Blanken would create an impact by passing through a residential area immediately west of the freeway.

3. Impact Due to Street Blockage from Loading (Truck or Pedestrian Pickup and Drop-off)

Truck and pedestrian loading operations would be internal to the site, away from streets.

4. Impact Due to Changes in Street Right-of-way Characteristics

Blanken Avenue would be relocated to the east and widened to four lanes between Harney Way and the first garage entrance from the west. There would be no other right-of-way change.

C. 1. Impact on Surrounding Parking Facilities

The project would not affect surrounding parking facilities. Four hundred to 700 unmarked spaces would be lost for major Candlestick Park events and the on-street parking demand in the Little Hollywood residential area could increase if appropriate mitigation measures were not taken. As detailed in Table E-1, the project would generate demand for 4,120 parking spaces, about 200 more than the 3,893 proposed on the project site. If discouraged from parking in Little Hollywood, the 200 vehicles in excess of available spaces would probably park in the Candlestick lots or adjacent to the project site on Jamestown Avenue.

D. 1. Impact on Bicycle Accessibility (Facilities in Area)

Cyclists who use Harney Way to travel to the designated bicycle route on Jamestown Avenue would experience more vehicular traffic. Access to the project area would be improved.

E. 1. Impact on Pedestrian Accessibility

Pedestrian flow within two blocks of the site is negligible. Pedestrians would have access to the site at all parking entrances/exits in addition to possible crosswalks to the proposed Shoreline Park. Pedestrians on Blanken Avenue from the west would not be able to enter the project until 600 feet east of the project boundary.

V. ALTERNATIVES

Table E-3 shows daily and evening peak-hour trip generation from the project (designated Alternative 1A) and from four alternatives: 1B, 1C, 2, and 3. Floor areas and dwelling units associated with each are tabulated in Tables E-4, E-5, and E-6. A fifth alternative, "open space," is not shown because its trip generation is estimated to be near nil. The trip generation comparisons in the table can be used to compare the traffic and parking impacts of the alternatives.

Trip generation from Alternative 1B would be the same as from the project because it is an alternative arrangement of the same uses. While daily trip generation from Alternative 1C is about two-thirds that of the project, peak-hour traffic levels are approximately equal. Daily trip generation from Alternative 2 is about 45 percent of the project's, and peak-hour generation is around one-fourth.

Alternative 3's daily and peak-hour trip generation are each one-eighth that of the project.

VI. MITIGATION MEASURES

Suggested Mitigation Measures that could be proposed by the developer to minimize impacts

1. If half the restaurant/convention facility were eliminated and placed in the hotel, there would be a 14 percent reduction in outbound afternoon peak-hour traffic from the project. Similiarly, removing the shops, which have the next highest afternoon peak-hour trip generation rate, would reduce the peak traffic an additional seven percent. These two changes would reduce the peak traffic volumes by one-fifth.

2. As part of the project plan, a minibus shuttle would be developed to facilitate transit to the downtown area. The project sponsor could arrange to have special buses serve the hotel to and from the airport and/or the Cow Palace for special events.

3. By making walking distances very long on the western portion of Blanken Avenue as it enters the project, i.e., allow pedestrian access only after 600 feet inside the project, project-bound motorists would be discouraged from parking in the Little Hollywood area and walking to project buildings. With the first parking entrance 600 feet east of the freeway on Blanken Avenue, motorists would find it more convenient to use the freeway interchange than to enter the project on west Blanken.

4. Parking charges should not be instituted within the project. If there were parking charges, some drivers would attempt to cut costs by parking in free spaces in the Little Hollywood area. This measure would require the project sponsors to take steps to keep the Candlestick Park-generated parkers from using the project's free spaces.

5. The measure of staggered working hours for office employees would be effective in averting high peak traffic levels that could cause overspill onto Blanken Avenue.

6. Access should be maintained between all parts of the project and the freeway interchange when the reverse-flow operation is in effect during events at Candlestick Park. Harney Way and Jamestown Avenue are reversible at these occasions, and all project-generated traffic would have to use Blanken Avenue inbound after events or outbound before events. This impact can be avoided by developing access points for all project traffic from

Alanna Way, i.e., allowing vehicle access to the total project from Alanna Way on the freeway side of the reserve-flow operation. To improve traffic operation, the Harney Way/Alanna Way intersection should be at least three hundred feet west of the project access point between the hotel/convention area and the office/restaurant area. The Alanna Way access to the project should be midway between the freeway underpass and the Alanna Way/Harney Way intersection.

Suggested Mitigation Measures That Could Require Public Agency Action

1. Traffic might be further decreased if the No. 29 Muni Bus line were extended to the project site. The bus could carry project employees directly to the Leland shopping area and the Southern Pacific's Bayshore train station. While traffic to the proposed Shoreline Park should be minor, the suggested No. 29 extension could bring urban residents to the park.

2. A new bypass road south of Blanken Avenue, such as an extension of Sunnydale Avenue or Beatty Road over the Southern Pacific Railroad tracks to Old Bayshore, would divert project-generated traffic from Blanken Avenue and Little Hollywood. These possible extensions are under study by Caltrans, San Mateo County, and the City of Brisbane. The extension of Beatty Road might connect to the proposed freeway interchange at Sierra Point.

3. Traffic signals would be required at two intersections: Alanna Way/Harney Way and Blanken Avenue/Harney Way. Improvements at the Tunnel Road/Blanken Avenue intersection may be required, such as strip markings, street widening, signals, etc. Arterial stops could also be installed for Blanken Avenue traffic west of the project. The extension of Beatty Road to Old Bayshore would be used more and Blanken less if stop signs were on Blanken to discourage traffic from using the Blanken entrance to the project. A more severe measure could consist of a traffic diverter on Blanken to force traffic to use the Beatty Road access to the project; however, this could also be a nuisance to the residents of Little Hollywood. Signals, stop signs, and traffic diverters would require installation by the San Francisco Department of Public Works.

TABLE E-4

Executive Park
Vehicular Trip End Generation Rates

Land Use Type	Unit	Trip Ends/Unit Daily 2-Way	P.M. Peak Hour In	P.M. Peak Hour Out
Office	1,000 sq. ft.	11	0.2	1.6
Hotel	1,000 sq. ft.	10	0.3	0.3
Restaurant/ Convention	1,000 sq. ft.	20*	10.0	10.0
Restaurant	1,000 sq. ft.	50	5.0	3.0
Shop	1,000 sq. ft.	40	2.5	2.5
Residential with School	dwelling units	6	0.5	0.2
Light Industry	1,000 sq. ft.	3	0.1	0.5
Open Space	acre	0	0	0

*Average day. On maximum days = 50

Source: California Department of Transportation Ten Progress Reports on Trip Ends Generation Research Counts 1965 to 1975, prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

TABLE E-5

Executive Park
Floor Areas and Dwelling Units

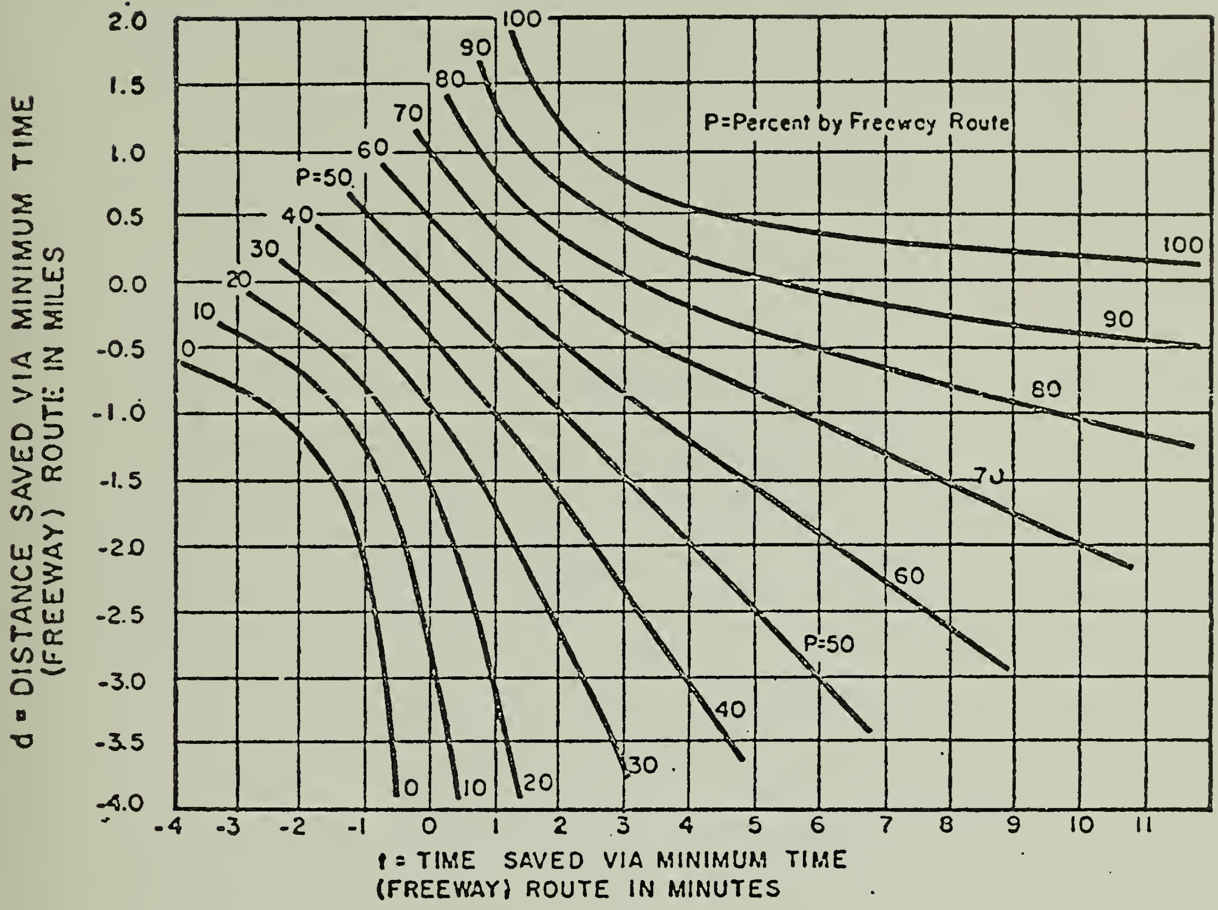
Land Use Type	Quantity by Alternative 1A & 1B	1C	2	3
Office	863,640	662,000	0	0
Hotel	110,000	101,520	0	0
Restaurant/ Convention	63,888	88,000	0	0
Restaurant	14,400	0	0	0
Shop	61,400	0	61,400	0
Residential with School	0	0	700 du	0
Light Industry	0	0	0	647,000
Open Space*				
Total	1,113,328	851,520	61,400+ 700 du	647,000

*Alternative 4. No trips generated.

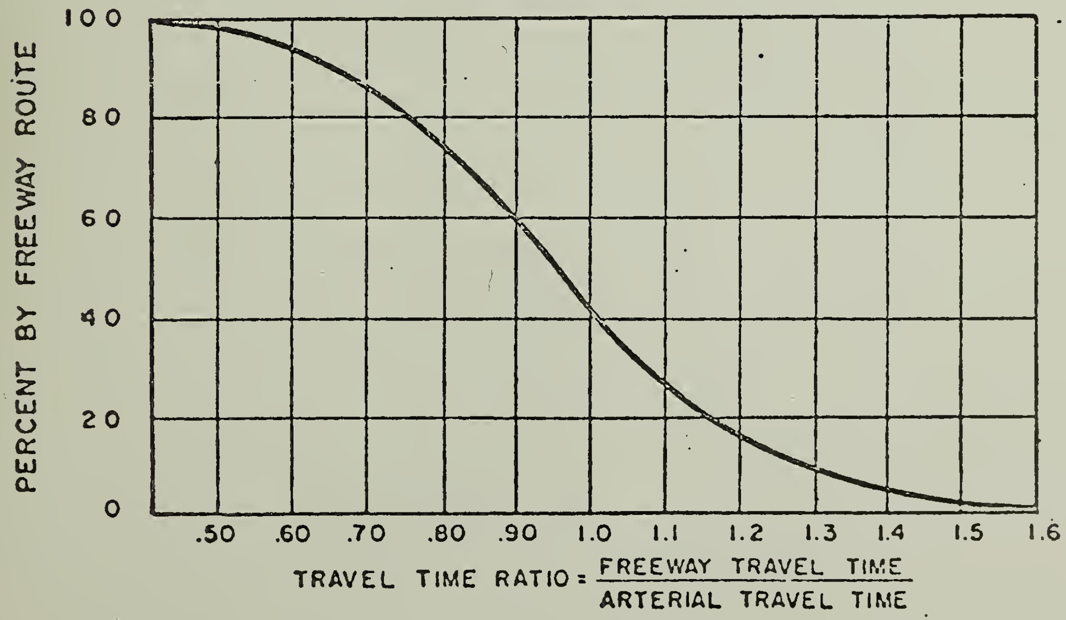
Source: Yerby Corporation

NETLOAD DIVERSION CURVES

CALIFORNIA DIVERSION CURVES



B.P.R. DIVERSION CURVE



SOURCE: WEST BAY GRAVITY TRAFFIC MODEL, CALTRANS 1974

Appendix D

Air Quality

AIR QUALITY CONSIDERATIONS

1. Pollutants and Standards

a. Pollutants

Carbon Monoxide

Carbon monoxide (CO) is a clear, odorless gas which, in high concentrations, can cause dizziness, unconsciousness, and even death. The major source of carbon monoxide is the automobile. High concentrations of carbon monoxide are mainly a local problem, occurring near areas of heavy auto traffic when ventilation is poor.

Oxidant

Oxidant--also known as photochemical smog--results from a complicated reaction between nitrogen dioxide and organic compounds under the influence of ultraviolet rays of sunshine. Production of oxidant smog is promoted on warm, sunny days when ventilation is low.

Oxides of Nitrogen

These gases, mainly nitric oxide (NO) and nitrogen dioxide (NO_2), are formed during combustion at high temperatures. Their main source is automobiles. They react with sunlight in the atmosphere and are involved in the production of photochemical oxidant.

Suspended Particulates

Suspended particulates are liquid or solid particles suspended in the air. Much of this particulate matter is of natural origin; in industrialized areas man-made varieties are far more prevalent.

Hydrocarbons

Hydrocarbons are the result of incomplete combustion and range in complexity from simple gases to complex compounds of carbon, hydrogen, and oxygen. This pollutant is important because of its ability to react in the atmosphere with oxides of nitrogen to form photochemical smog.

b. Standards

The following table summarizes ambient air quality standards applicable in California. The State standards are specific concentrations and durations of air pollutants that reflect the relationship between the intensity and composition of pollution to undesirable effects. The State standards are target values, and no timetable exists for their attainment.

The Federal primary standards represent levels of air quality necessary for protection of public health, with an adequate margin of safety. The provisions of the Clean Air Act as amended in 1970 require that by 1975, or by 1977 if an extension is granted, the Federal standards should not be exceeded more than once per year.

AMBIENT AIR QUALITY STANDARDS

Pollutant	California Standards		National Standards	
	Averaging Time (hours)	Concentration	Averaging Time (hours)	Concentration
Photochemical oxidant	1	0.10 ppm *	1	0.08 ppm
Carbon monoxide	12 1	10 ppm 40 ppm	8 1	9 ppm 35 ppm
Nitrogen dioxide	1	0.25 ppm	Annual	0.05 ppm
Sulfur dioxide	24 1	0.04 ppm 0.05 ppm	24 ---	0.14 ppm ---
Suspended particulates	Annual geometric mean *** 24	60 g/m^3 ** 100 g/m^3	Annual geometric mean 24	75 g/m^3 260 g/m^3

Source: California Air Resource Board, California Air Quality Data, Vol. V, No. 3, July-September 1973.

*Parts per million.

**Micrograms per cubic meter.

***The annual geometric mean is the mean of the natural logarithms of concentration. This is used because it has been found that air pollutant concentrations, over a long time, tend to be distributed log-normally (the logarithm of concentration has a normal, or Gaussian distribution).

2. Model Descriptions

a. Local Scale

The local-scale analysis provides a reasonable estimate of carbon monoxide concentrations downwind from vehicular traffic under adverse conditions. Traffic volumes indicate that the area of highest emissions is U.S. Highway 101 immediately west of the site. The analysis was carried out for this roadway as representing the worst possible case.

Meteorological conditions assumed are a wind at a 22½-degree angle to the roadway with a steady speed of one meter per second for the one-hour calculation and two meters per second for the eight-hour calculation (BAAPCD[1] 1975). Atmospheric stability is assumed to be stable (Turner Category E) for the one-hour average and neutral (Turner Category D) for the eight-hour average (Turner 1969).

The traffic parameters used in the calculation are given below.

Alternative	Traffic Volume	Average Speed
Present Peak-Hour	11,000	50 mph
(1975) Peak 8-Hour	67,650	55 mph
With Project	13,650	45 mph
(1981)	74,650	55 mph
No Project	11,000	50 mph
(1981)	67,650	55 mph

The lower average speed for the peak traffic hour with the project is due to congestion caused by project traffic. Present and future emission factors at the various average speeds were obtained from the latest published figures (BAAPCD 1975). The model applied was developed by the California Department of Transportation (Beaton et al 1972).

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[1] Bay Area Air Pollution Control District.

b. Area-Wide Scale

The area-wide analysis is designed to provide estimates of the averaged annual concentration produced by project traffic averaged spatially over a one-square-kilometer area.

Model input is the average daily emissions from the project. Sources considered included U.S. Highway 101, Blanken Avenue, Harney Way, Jamestown Avenue, and the project parking areas. The traffic parameters used in estimating daily emissions are given below.

Road	Average Daily Traffic	Average Speed
U.S. 101		
Present (1975)	123,000	55
With Project (1981)	134,600	50
Harney Way		
Present (1975)	3,000	25
With Project (1981)	14,600	25
Blanken Avenue		
Present (1975)	2,000	25
With Project (1981)	3,500	25
Jamestown Avenue		
Present (1975)	2,000	25
With Project (1981)	3,500	25

Emissions from parking lots were calculated assuming that each vehicle traveled 0.2 mile within the parking lot at an average speed of 10 miles-per-hour. In addition, it was assumed that each vehicle spent a total of three minutes idling while within the parking area.

Emissions from all of these sources were computed for a 24-hour period and summed. These emissions, expressed in micrograms per second per square kilometer, were used in the following formula:

$$C = 150 \frac{Q_A}{U}$$

where Q_A is the annual average emission per square kilometer and U is the annual average windspeed. The quantity 150 is an empirical constant developed by the BAAPCD.

The annual average concentrations are converted to annual maximum concentrations at various averaging times using the observed standard geometric deviation of carbon monoxide concentrations. It is assumed that concentration data are distributed lognormally, and that the observed standard geometric deviations are invariant and hence applicable to future years with climatologically average meteorological conditions.

c. Regional Scale

The regional-scale analysis provides a conservative estimate of concentrations due to project emissions after they are thoroughly mixed, both vertically and horizontally, and carried a considerable distance downwind.

Regional emissions were based on the vehicle miles traveled (VMT) associated with the project and the alternatives. VMT were estimated using an average one-way trip length of 10 miles. Emissions were computed for an average vehicle speed of 45 miles per hour.

Total emissions are assumed to emanate from a ground-level point source at the center of the project site.

The model disperses pollutants using a Gaussian wind rose sector averaged plume model, with thorough mixing assumed to be reached 10 kilometers downwind under meteorological conditions of a two-meter-per-second wind with a 300-meter mixing height (BAAPCD 1975).

References

Bay Area Air Pollution Control District. 1975. Guidelines for air quality impact analysis of projects, Information Bulletin.

Beaton, John L., et al. 1972. Mathematical approach to estimating highway impact on air quality, California Division of Highways Report NC CA-HWY-MR6570825-4-72-12.

Turner, D. B. 1969. Workbook of atmospheric dispersion estimates, Environmental Protection Agency Publication AP-26.

Appendix E

Vegetation List

The following plants are to be found on the project site before the project (the list was prepared by Bob La Rocca):

TREES

BOTANICAL NAMES	COMMON NAMES
Acacia baileyana	Bailey Acacia
Acacia melanoxylon	Black Acacia
Cupressus macrocarpa	Monterey Cypress
Eucalyptus citriodora	Lemon-scented Gum
Eucalyptus ficipolia	Red-flowering Gum
Eucalyptus globulus	Blue Gum
Melaleuca nesophila	Pink Melaleuca
Myoporum laetum	Myoporum
Pinus muricata	Bishop Pine
Pinus radiata	Monterey Pine
Salix caprea	French Pussy Willow

SHRUBS

BOTANICAL NAMES	COMMON NAMES
Acacia verticillata	Acacia
Baccharis pilularis	Dwarf Coyote Brush
Ceanothus griseus	Carmel Ceanothus
Cytisus scoparius	Scotch Broom
Eriogonum latifolium rubescens	Red Buckwheat
Garrya elliptica	Coast Silktassel
Hakea sauveolens	Sweet Hakea
Hetermeles arbutifolia	Toyon
Pittosporum crassifolium	Karo

GROUNDCOVERS & GRASSES

BOTANICAL NAMES	COMMON NAMES
Aira caryophylla	Silvery hair grass
Akena barata	Weed
Briza maxima	Rattlesnake grass
Briza minor	Quaking grass
Bromus caranus	Brome grass
Cortaderia selloana	Pampas grass
Elymus glaucus	Blue Wild Rye

GROUNDCOVERS & GRASSES (continued)

Festuca ovina duriuscula	Fescue
Foeniculum vulgare dulce	Finocchia
Koeleria cristata	June grass
Lotus corniculatus	Bird's-Foot Trefoil
Mesembryanthemum spp.	Ice Plant
Poa annua	Annual Blue Grass
Typha latifolia	Cat's-tail
Viscaria spp.	Local weeds & thistles

Properties surrounding the project site consist of the following planting types.

1. Man-made residential planting across Highway U.S. 101.

2. State Department of Transportation Freeway planting on strips of land on both sides of U.S. 101.

3. The adjacent contiguous parcel to the project site is a city park consisting largely of Eucalyptus groves and some conifers. Understory planting is natural grasses and weeds.

Trees range in height from 3 feet tall to approximately 15 feet tall. Caliber sizes of the tree trunks range from 1" caliber up to approximately 4"-5" caliber. The terrace portion of the hills are planted with conifers and evergreens, mostly made up of pines, cedars, and eucalyptus.

The shrubs are intermixed throughout the terraces and other portions of the site and some are stunted trees.

The groundcovers and grasses are also scattered throughout the terraces and other portions of the site and some are stunted trees.

The groundcovers and grasses are also scattered throughout the site with the lower portion of the site covered mostly with grasses. Most ground covers occur on the flat part of the terrace on the hillside.

There are no endangered plant species on the site (REF: "Inventory of Rare & Endangered Plants of California, California Native Plant Society, 1975").

Appendix F

Archaeological Report

Letter from Miley Holman

THE
adán e. treganza anthropology museum

SAN FRANCISCO STATE UNIVERSITY
1600 HOLLOWAY AVENUE
SAN FRANCISCO, CALIFORNIA 94132

RECEIVED
MAR
WHISLER/PATRI

March 23,1976

Stu During
Whisler-Patri
350 Pacific Avenue
San Francisco, CA 94111

Dear Mr. During,

On Monday, March 22, an archaeological reconnaissance was carried out on the proposed location of the San Francisco Executive Park near Candlestick Park, San Francisco. I am herein transmitting the results of that investigation to you.

The proposed Executive Park site is a parcel of land located on the southern edge of the hill which shelters Candlestick Point; the approximate boundaries of the parcel can be described as Harney Way on the south, Bayshore Freeway on the west, and the slope of the hill on the north and east. In recent history the property contained war time housing, the pads of which are still visible. At the present time the property is being used as a parking lot west of Blanken Avenue, which bisects it.

Prior to the actual reconnaissance maps and records on file at the museum were checked for any indications of archaeological remains recorded for the general area of the project. No sites are recorded for the area, but there are sites located to the south in the San Bruno Mountain area.

The actual reconnaissance was conducted by myself with the aid of a project map provided by your office. Then, all the open space within the project area was carefully inspected for any surface indications of archaeological remains. This was made difficult by the remains of cement housing pads and streets left in the area, let alone the apparent fill material which has been dumped over the years.Some of the material which has obviously been dumped in the area represents exactly the material

RESEARCH INTERPRETATION EDUCATION

found in a typical bay shell midden site like those extant on San Bruno Mountain; this is a dark material filled with broken shell, a principle food source of the Indians in the general area. However I don't believe that the small piles encountered by me came from an Indian site; the consistancy was more sandy, such as would come from dredging in the near by bay. Archaeological middens in the area retain a more friable soil like quality.

No surface indications of archaeological remains were encountered by me during my reconnaissance. This does not mean however, that such remains would not be uncovered by earth moving activities; they could well exist in a buried state under either the fill material or the cement. Should such remains be uncovered during construction activities, it is recommended that work be halted in the immediate area of the find until a qualified archaeologist has been called in and had the opportunity to make an evaluation and make recommendations for preservation and/or necessary salvage of all buried remains.

Sincerely,

Miley Paul Holman

Miley Paul Holman
Assistant Curator

Appendix G

Acoustic Study

PNP
STU
NTG

ACOUSTICS STUDY

San Francisco Executive Park

San Francisco, California

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3 July 1975
Revised: 23 February 1976
19 March 1976

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SUMMARY

This study was undertaken to determine the acoustic conditions and suitability of the proposed site for San Francisco Executive Park.

The conclusions of our report are:

1. The controlling noise source at the site is traffic on Highway 101.
2. Our land use compatability assessment indicates:
    - a) The eastern portion of the site (about 22% of the total land area) is conditionally acceptable for residential use.
    - b) About 22% of the site is suitable for office and commercial-retail development with an additional 36% conditionally acceptable provided a detailed noise analysis with needed noise insulation is included in the design.
    - c) About 84% of the site is suitable for light industrial use and wholesale-commercial use.
    - d) About 22% is acceptable for playgrounds and parks.
    - e) About 84% is conditionally acceptable for hotel development provided a detailed noise analysis with needed noise insulation is included in the design.
3. A land use considered incompatible to a particular portion of the site can be located in that area provided that appropriate noise control measures are taken to reduce the traffic noise to an acceptable level.
4. Less noise-sensitive land uses may be developed along Highway 101 to act as a buffer to reduce noise intrusion; thus, increasing areas for development of noise-sensitive land uses.

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I: FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL NOISE

A. Description of Environmental Noise

Sound is produced by rapidly vibrating solid objects, such as vocal chords or guitar strings, causing changes in air pressure. The resulting sound waves radiate away from the source in all directions (Chanaud, 1972; Humphreys and Melluish, 1971). Noise is defined as unwanted or undesired sound.

Three qualities characterize the effect of noise on the listener:

1) the frequencies of the noise;
2) the intensities of the noise; and
3) the time-varying (or changeable) character of the noise.

The frequency of a sound is the number of times the sound source vibrates in one second. One complete vibration is a cycle. A string vibrating 261 times in one second produces a sound whose frequency is 261 cycles per second (cps). This sound is the subjective tone of middle C (Doelle, 1972). The unit of frequency is the Hertz (Hz) which is numerically equivalent to cps.

The human ear is sensitive to a wide range of sound intensities. A logarithmic scale is used to compress this wide range. The logarithmic scale also relates to the way people hear. That is, people hear changes in sound intensities in proportion to the logarithm of the intensities. This logarithmic scale, called the decibel (dB) scale, is named in honor of Alexander Graham Bell. The threshold of human hearing corresponds roughly to 0 dB. Figure 1 shows the sound level of typical sources encountered in the environment.

Environmental noise is generated by both distant and near sources, and varies continuously. The distant sources may include traffic, wind in the trees, and industrial activities. These sources are fairly constant for short periods of time, but vary from hour to hour and day to day as natural forces change. Nearby sources such as a car passing by or an aircraft flying overhead cause the environmental noise level to fluctuate from moment to moment.

When measuring environmental noise, two of the three acoustic parameters discussed earlier--frequency and intensity--are accounted for with a special filter on a sound level meter. This filter, called the A-weighting filter, is needed since a person does not hear the entire frequency spectrum, but is limited to a range of 20 to 20,000 Hz. Within this range the ear does not hear the lower frequencies as acutely as the higher frequencies. The A-weighting filter electronically weights the amplitudes (or levels) of the various frequencies approximately in accordance with a person's hearing sensitivity. The weighted amplitudes are then summed to produce a single number, the A-weighted level (U. S. EPA, 1971).

A-weighting (dBA) has been available since the late 1930s and is one of the most accurate ratings for predicting loudness (Parkin _et al_, 1968).

	Decibels, A-Weighted	
CIVIL DEFENSE SIREN (100')	140	
JET TAKEOFF (200')	130	
	120	
RIVETING MACHINE	110	ROCK MUSIC BAND
EMERGENCY ENGINE-GENERATOR (6') DC-10 FLYOVER (700')	100	PILE DRIVER (50')
TEXTILE WEAVING PLANT SUBWAY TRAIN (20')	90	BOILER ROOM PRINTING PRESS PLANT
PNEUMATIC DRILL (50')	80	GARBAGE DISPOSAL IN HOME (3') INSIDE SPORT CAR, 50 MPH
FREIGHT TRAIN (100') VACUUM CLEANER (10') SPEECH (1')	70	
	60	AUTO TRAFFIC NEAR FREEWAY LARGE STORE ACCOUNTING OFFICE
LARGE TRANSFORMER (200')	50	PRIVATE BUSINESS OFFICE LIGHT TRAFFIC (100') AVERAGE RESIDENCE
	40	MINIMUM LEVELS, RESIDENTIAL AREAS IN CHICAGO AT NIGHT
SOFT WHISPER (5')	30	
RUSTLING LEAVES	20	RECORDING STUDIO
	10	
THRESHOLD OF HEARING IN YOUTHS (1000-4000 Hz)	0	

Figure 1: TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT AND INDUSTRY

Source: General Radio Company, 1972, and other data.

NOTE: The distance (in feet) between the source and listener is shown in parentheses.

A-weighting is incorporated in all sound level meters. The A-weighted scale accurately describes noise at a particular instant in time; however, environmental noise levels vary continuously.

Presently the time-varying character of A-weighted noise is accounted for differently by various concerned governmental agencies (U. S. Department of Transportation, State of California Environmental Quality Agency, Federal Aviation Administration, U. S. Environmental Protection Agency, etc.).

One method for incorporating the time-varying character of environmental noise involves accounting for the levels statistically. The statistical descriptors are the A-levels exceeded 90%, 50%, and 10% of the time, designated L_{90}, L_{50}, and L_{10}. L_{90} represents a good estimate of the background noise caused by distant sources. L_{50} is the average level, and L_{10} is the "average peak" level caused by nearby sources of short duration. Each of these single number descriptors accounts for the three dimensions of environmental noise: its frequency, intensity, and time-varying characteristics.

Currently, there are three measures to describe the noise environment in the vicinity of airports in the State of California. These include Composite Noise Ratings (CNRs), Noise Exposure Forecasts (NEFs), and Community Noise Equivalent Levels (CNELs). NEF descriptors are widely used by federal agencies concerned with land use planning and by the Federal Aviation Administration.

The Environmental Protection Agency has proposed the L_{dn}, or energy averaged A-level with a day-night weighting, as a measure of the overall effect of noise.

In this report noise levels will be specified as Community Noise Equivalent Levels (CNELs). The CNEL contours represent the average noise levels during a 24-hour day, adjusted to an equivalent level. This adjustment accounts for the lower tolerance of people to noise during evening and nighttime periods as compared to the daytime period. CNEL values are approximately equal to L_{dn} levels.

B. Human Reaction to Environmental Noise

The effects of noise on people can be grouped in three general categories:

1) Subjective effects of annoyance, nuisance, dissatisfaction;
2) Interference with activities such as speech, sleep, learning;
3) Physiological effects such as startle, hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Yet, at any given level, individual responses will vary considerably. Annoyance, nuisance, dissatisfaction, and startle effects can happen at virtually any level. The response of an individual depends on additional factors such as time duration, frequency content, background noise level, and the hearer's activity at the time. Background noise levels exceeding 55 dBA interfere with speech at a speaker-to-listener distance of about

12 feet (Beranek, 1971). Long-term exposure to levels exceeding 70 dBA causes hearing loss (U. S. EPA, 1974). Through extensive study it has been determined that (Beranek, 1954; Stevens et al, 1955):

1. Except in carefully controlled laboratory experiments, an increase of only one dB in A-level cannot be perceived.
2. Outside of the laboratory, a three-dB increase in A-level is considered a just-noticeable difference.
3. A change in A-level of at least 5 dB is required before any noticeable change in community response would be expected.
4. A ten-dB increase in A-level is subjectively heard as a doubling in loudness, and would almost certainly cause adverse change in community response.

About 10% of the population are so sensitive to noise that they object to any noise not of their own making. Thus, some complaints occur even in the quietest environments. Another sizable portion (about 25%) of the population, however, does not react or complain even in very severe noise exposures. In any given noise exposure, therefore, you should expect a variety of reactions from the people exposed, ranging from serious annoyance to no awareness. Noise abatement efforts do not affect the reactions of people who are either ultra-sensitive or insensitive to noise; noise control helps only the middle 2/3 of the population (Shultz, 1971).

B'. Effects of Climate on Noise

Climatological conditions such as wind, temperature, and humidity can significantly change the level of a sound as it propagates through air. The change in level due to climate is in addition to the attenuation due to distance and atmospheric absorption. Most climatic effects cause an additional reduction in sound level (Kurze and Beranek, 1972).

Climatological effects can cause changes in sound levels as follows:

1. An altitude change of 5000 feet results in a change in atmospheric pressure reducing a given sound level by about 0.8 decibels.

2. The air attenuates high frequency sound energy more than it does low frequency sound energy. Warm air attenuates sound more than does cooler air, and air at low humidity attenuates sound more than does high humidity air.

3. Fog, rain, sleet or snow do not reduce sound to any measurable extent.

4. Wind causes shadow zones that can reduce a sound level by 25 dB. Wind speed generally increases with height above the ground. The change in wind speed causes a variation in the speed of sound with height above the ground, and the sound waves are refracted (bent upward or downward). This refraction can cause a shadow zone into which no direct sound penetrates. Conversely, refraction can cause a channel-

ing or intensification of sound, causing sound to diminish more slowly than usual over long distances. A shadow zone is most commonly encountered upwind from a source, because the wind gradient bends the sound waves upward. The refraction of sound in a shadow zone reduces sound by 25 dB in mid frequencies as close as 1000' from the source. High frequency sound energy is attenuated by shadow zones more than low frequency sound energy.

5. Air turbulence, more likely during the daytime than at nighttime, can cause fluctuations in sound level. However, the excess attenuation due to turbulence is minimal.

6. A three-year Soviet study correlated climate conditions with measured sound levels. Sound level data were measured during the day and night, and at various distances and frequencies. Temperature, humidity, air velocity and wind gradients were also measured. This study found that excess attenuation due to climatic factors is greater during the day than at night. The excess attenuation is greater in the summer, decreases in spring and fall, and is least in winter (Williams and Miller, 1973).

Propagation of sound is dependent upon surface temperatures, air temperatures, wind direction, wind speed, sound paths, time of day, time of year, and various other factors. Tentative models have been employed to determine the effects of wind on sound propagation.

Conclusions of a study by C.C. Oliver (October, 1973) are as follows:

(1) Noise levels predicted with no consideration of wind and temperature gradients may be up to 6 dBA too high upwind of a highway and 3 dBA high downwind during daytime.

(2) In the absence of wind, excess attenuation of up to 10 dBA may occur within a few hundred feet of a highway due to negative temperature gradients.

(3) Reduction of noise levels with distance from a highway is diminished at night, especially with no wind.

In previous meteorological studies done by Ultrasystems, Inc. (Nov. 1972), for wind speeds under 15 Knots, no conclusive correlations could be made between wind speed, wind direction and sound propagation. At sites where wind speeds were of magnitudes up to 25 Knots, effects were noted. However, in their conclusions, this effect must be further analyzed before wind speed factor is accepted as being "real".

The major conclusions of these studies suggest that highway engineers should be aware that significant deviations in predicted noise levels may occur during meteorological conditions which are not uncommon. However, additional analytical development and experimental validation is required before definitive conclusions can be reached.

Because of the constant variability of climatic conditions, climatic effects have not been accounted for in our noise level predictions. Factors such as wind speed are variable from second-to-second; whereas, CNEL contours are an averaging of day and night noise levels. Thus, climatic conditions are predicted to have minimal effect on the CNEL contours for the Subject Project.

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C. Parameters of Traffic Noise

Three groups of parameters are analyzed when estimating traffic noise: those relating to (1) the traffic, (2) the roadway, and (3) the receiver.

The traffic parameters affecting noise are the number and type of vehicles passing a point during the time period of interest, and the average speed of the vehicles. Speed affects the noise generated by cars and trucks differently, so these vehicle categories are analyzed separately; the predicted noise levels from cars and trucks are then added together.

Highway noise increases as the number and the average speed of automobiles on it increase. For example, if the automobile traffic volume doubles, the noise level from automobiles increases by about 3 dBA. However, if the speed decreases to half, the noise level from automobiles decreases by about 6 dBA. The engine-exhaust system and tire-roadway interaction contribute prominently to the overall automobile noise.

Truck noise behaves differently. An average truck generates A-levels about 15 dB higher than a car; the sound energy contributed by a single truck is approximately equal to that from thirty cars. Because trucks usually operate at nominally constant engine rpm, their engine-exhaust noise does not change with road speed. The condition of the truck muffler is very important. A-levels 15 dB higher than average can result from improperly muffled trucks.

The major roadway parameter affecting highway noise is its slope, or gradient. For example, a 5% road grade adds about 3 dBA to truck noise but does not affect automobile noise. Noise resulting from the tire-roadway interaction can be influenced by the characteristics of both the tires and the roadway surface. Most noise prediction models assume a "normal" surface: moderately rough asphalt or concrete. Variations in A-levels of ± 5 dB can occur for surfaces of rough asphalt with large voids or grooved concrete at one extreme, and very smooth, seal-coated asphalt at the other.

The receiver parameters are those which affect the relationship of the receiver's position to the vehicle-roadway noise source. The distance between the observer and the highway is the major factor in this category; the greater the distance, the lower the noise level. Doubling the distance from the highway (for example, going from 200 feet to 400 feet, or from 2000 feet or 4000 feet) reduces the average traffic noise at the receiver's position by about 4 dBA. Beyond distances of a mile, the drop-off rate is about 6 dBA per doubling of distance. The additional attenuation, or noise reduction, results in part from the effect of atmospheric absorption of sound.

Natural and manmade shielding barriers that block the line-of-sight from the receiver to the highway are another "receiver" factor affecting highway noise propagation. Natural barriers include hills or other changes in ground elevation, and vegetation, including trees. Manmade shielding elements include houses or other structures, walls, earth berms (a built-up shoulder alongside a road, etc.).

The acoustical effectiveness of the shielding depends on the extent to which it blocks the line-of-sight to the highway, and on the characteristics of the barrier itself. For example, if a barrier blocks only half the view to a length of highway which would otherwise be fully exposed, the noise level reduction would be limited to only 3 dBA, regardless of the barrier structure.

If the view of highway vehicles is completely shielded, the A-level attenuation by a solid barrier may vary from 5 dB for low barriers to a maximum of about 25 dB for very large barriers. The first row of buildings reduces highway noise 4.5 dBA, and each additional row of buildings provides an additional 1.5 dBA, up to a limit of 10 dBA total reduction (Kugler and Piersol, 1973). Trees, if densely planted, and at least 15 feet tall, reduce noise by about 5 dBA per 100 feet of woods depth, approaching a maximum of 10 dBA (Miller, L., 1970).

II: NOISE ANALYSIS

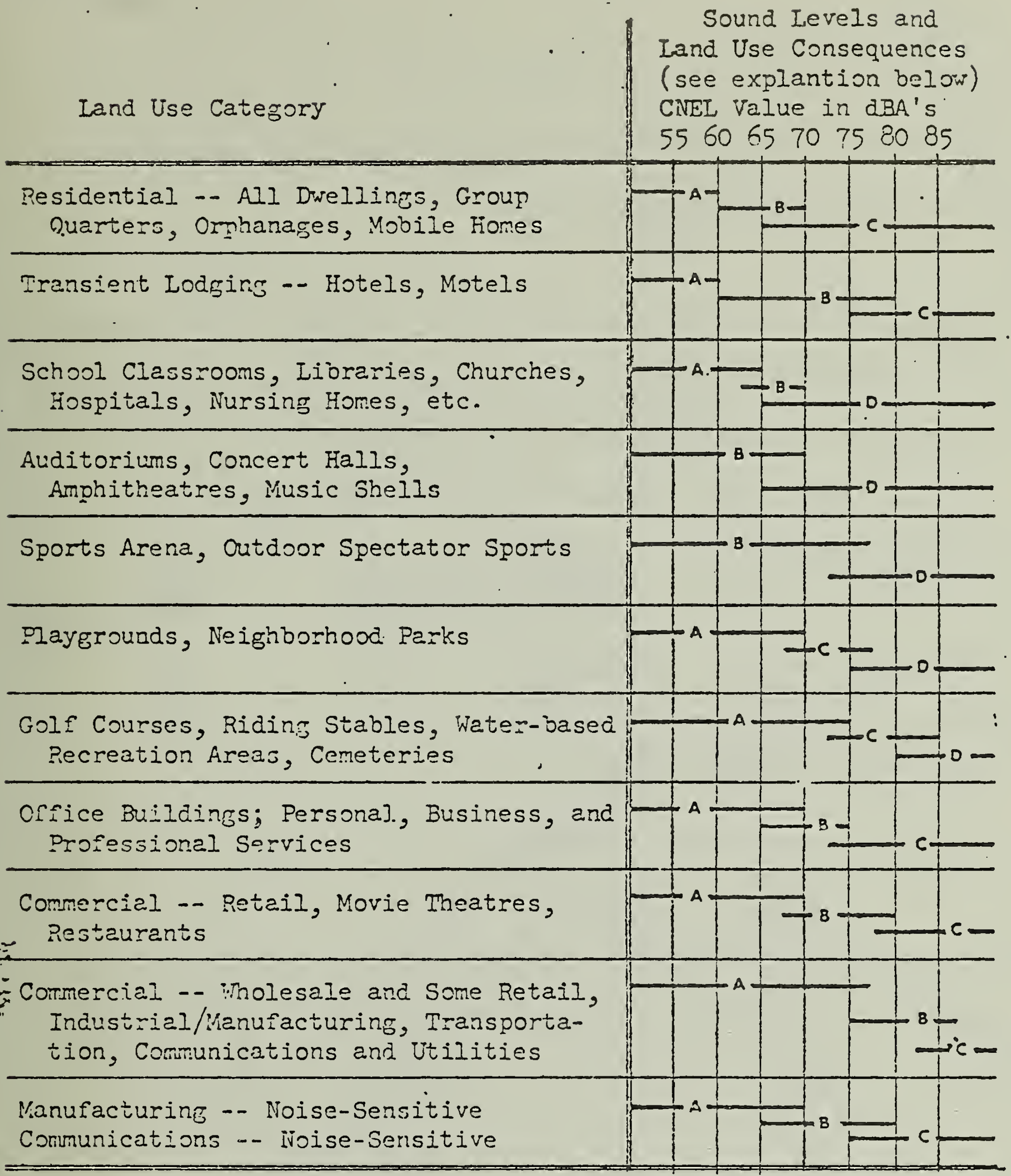
A. Criteria for Acceptability

Article 4, Section 1092, Noise Insulation Standards, of the California Administrative Code Title 25, states that all hotels, motels, and multifamily dwellings located within exterior CNEL contours of 60 dBA generated by an existing or adopted major roadway or airport shall require an acoustical analysis. This acoustical analysis must show that interior noise levels, with windows closed, do not exceed an annual CNEL of 45 dBA.

Title 4, Subchapter 6, of the California Administrative Code establishes the acceptable level for persons residing in the vicinity of an airport. Present California statutes discourage residential use of land where CNELs are 70 dB or higher, and in 1985 will limit this to CNEL of 65 dB. This criterion level was established for persons residing in urban residential areas where houses are of typical California construction with windows partially open.

Figure 2, page 11, shows our recommended land use compatibility relationships based on the California Noise Insulation Standards and an adaptation of the land use compatibility chart for community noise prepared by the San Francisco Department of City Planning in Transportation Noise -- Environmental Protection Element of the Comprehensive Plan of San Francisco (1974).

Figure 2: LAND USE COMPATABILITY CHART FOR COMMUNITY NOISE



Explanation of Land Use Consequences

A. Satisfactory, with no special noise insulation requirements.

B. New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

C. New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

D. New construction or development should generally not be undertaken.

B. Present Conditions

Noise levels at the site are generated by three major sources: traffic on Highway 101; traffic on Harney Way within the site; and aircraft from San Francisco International Airport.

Highway 101 traffic is the controlling source of noise. CNEL* contours of present conditions were determined from the following traffic information provided by Caltrans (State of California, 1974):

-- Average Annual Daily Traffic, Two-Way (1974): 121,000

-- Car Distribution:	daytime (0700-1900) -	76%
	evening (1900-2200) -	11%
	nighttime (2200-0700) -	13%
-- Truck Distribution:	daytime -	79%
	evening -	5%
	nighttime -	16%

-- Percentage of Trucks (daily): 7%

-- Average Speed: 50 mph, six lanes.

These contours are shown on the Noise Contour Map, Figure 3, page 13. The contours are located at the following distances from Highway 101:

CNEL	Distance
80	75'
75	340'
70	680'
65	1350'
60	3200'

---

*Using the method outlined in Transportation Noise and Noise from Equipment Powered by Internal Combustion Engines, Wyle Laboratories, U. S. Environmental Protection Agency PB 208-660, 1971, Springfield, Virginia.

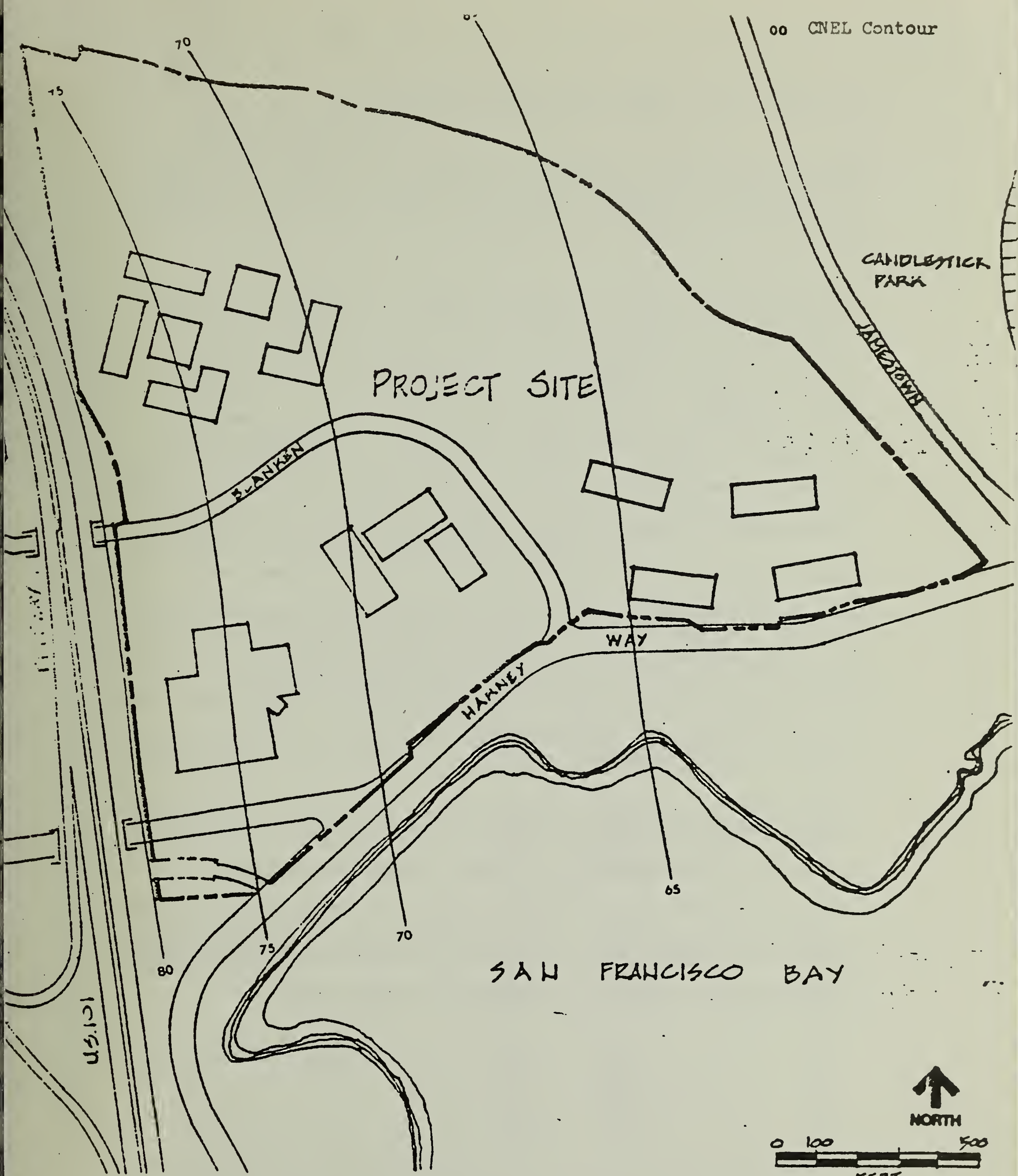


Figure 3: CNEL CONTOURS AT THE PROJECT SITE (1974)

Note: See Figure 2, page 131 for land use compatibility information.

The entire site is within the CNEL 60 contour.

Truck noise is increased by about 2 dBA due to the $3\frac{1}{2}\%$ grade on Highway 101.

Harney Way is the southern boundary of the site. Under normal conditions, the traffic on Harney Way is not a source of noise impact; traffic generates a CNEL of 60 at 30' from the roadway. Therefore it has less noise effect than traffic on Highway 101. Candlestick Park events can greatly increase traffic on Harney Way. The maximum increase occurs about 7-10 times per year, usually during football season on Sundays, and may add an additional 10,000 vehicles on the roadway. This vehicular traffic could increase the noise level 50' from the road to an L_{50} of 62; however, since the ambient noise level there is already high, we feel that these occasions have little impact on overall noise conditions and should not influence decisions regarding land use at the site.

Aircraft operations at San Francisco International Airport contribute little to the noise levels at the site. Takeoffs from Runways 01-L and 01-R pass near the site. However, these planes are at sufficient altitudes so that they do not generate levels equal to or exceeding CNEL 60 at the site (San Francisco International Airport, 1973).

C. Future Noise Conditions

In the future noise levels generated by Highway 101 should not increase from those shown in the Noise Contour Map. Although the volume of vehicular traffic is expected to increase, the average noise level of individual vehicles in the future will decrease. This decrease will occur because of California Vehicle Code 27160, which sets the maximum permitted noise level for present and future new vehicles sold in the State of California. This regulation, which is presented in Table 1 below, is already having an effect on the new car market, as several new American and European cars cannot be sold in California because they exceed the present permissible noise levels.

Table 1: MOTOR VEHICLE NOISE STANDARDS (Applied to New Motor Vehicles)

Source: California Motor Vehicle Noise Standards (State of California, 1971).

Vehicle Type	Manufactured After	Manufactured Before	dBA*
Motorcycles	1969	1973	88
	1972	1975	86
	1974	1978	80
	1977	1988	75
	1987		70
Motor Vehicles (gross weight of more than 6000 pounds)	1967	1973	88
	1972	1975	84
	1974	1978	80
	1977	1988	75
	1987		70
All other motor vehicles	1967	1973	86
	1972	1975	84
	1974	1978	80
	1977	1988	75
	1987		70

---

*As measured at a distance of 50' from the centerline of travel.

Aircraft noise from San Francisco International Airport is estimated to decrease 5 dB by 1985. This decrease will occur as a result of the Airport expansion which will allow more of the larger and quieter aircraft to use the Airport. This use will require greater spacing between aircraft landings and takeoffs, consequently limiting the annual number of operations and reducing noise levels below those of 1972 (San Francisco International Airport, 1973). In addition, Federal Aviation Administration regulations encourage noise abating flight patterns, such as steeper takeoffs and landings, and will reduce future noise levels (Foster, 1975).

D. Land Use Compatability Assessment

An examination of the Noise Contour Map with reference to the land use categories in Figure 2 shows:

1. The eastern portion of the site (about 22% of the total land use) is less than CNEL 65 dBA and is conditionally acceptable for residential developments. A detailed analysis of the noise reduction requirements is required and needed noise insulation features must be included in the design in order to reduce noise intrusions to a satisfactory level.

2. About 84% of the site is conditionally acceptable for hotel and/or other transient lodging development provided a detailed noise analysis with needed noise insulation is included in the design to mitigate noise intrusions.

3. About 22% of the site is compatible with playground and neighborhood park development with no special noise insulation requirements.

4. About 22% of the site is acceptable for office building, retail, commercial, movie theatre, and restaurant developments with an additional 36% conditionally acceptable for such development, provided a detailed noise analysis with needed noise insulation is included in the design.

5. About 84% of the site is acceptable for wholesale commercial, industrial/manufacturing, communication, transportation, and utility facilities with the remainder of the site conditionally acceptable for such development provided a detailed noise analysis with needed noise insulation is included in the design.

If locating an incompatible land use in a particular area of the site is desirable, this can be done using appropriate noise control. The two most feasible ways of decreasing traffic noise are: (1) shielding with barriers, and (2) reducing noise transmission into the building using special noise control construction.

Shielding with noise barriers. If the line of sight between a noise-sensitive land use, such as a residence, and a roadway is slightly broken by a barrier of intervening terrain, the traffic noise at the residence is reduced by at least 5 dBA. If the line of sight is broken by a significant amount, 5 to 10 feet or more, the barrier reduces the traffic noise by up to 25 dBA.

Height and location of barriers are selected based on the amount of attenuation required to mitigate the noise impact. The higher the wall, the more noise reduction it provides. The closer a given wall is located to receiver or the roadway, the more attenuation the wall will provide. A wall required to reduce noise by 5 dBA must have a minimum surface density of 3½ pounds per square foot. Therefore, the wall can be either 1" thick wood, ½" thick cement board, 1/8" thick steel or a like material. A barrier designed to reduce the noise by 25 dBA must have a minimum surface density of six pounds per square foot--2" of wood, 1" of cement, or ¼" steel. Airtight construction is required for a barrier wall.

The buildings closest to the highway can effectively shield those located behind them as long as they break the line of sight to the freeway by at least 90° or more.

Noise control construction. Most sound energy, or noise, is transmitted into a building through the windows, whether closed or open. Where exterior noise is a problem, the noise can be reduced to an acceptable level within the building by use of acoustical windows: double-glazed units or laminated glass. The air space between double-glazed units is typically a minimum of 2". Some commercial units, however, are built with a 4" air space. Laminated acoustical glass is produced in three thicknesses: $\frac{1}{4}$", $\frac{1}{2}$", and 3/4". Fixed, sealed windows are the best for noise reduction. However, it is possible to use an operable sash window if the window frame is tightly fitted and provided with a well-sealing gasket. In rooms with sealed windows or double-glazed windows, mechanical ventilation must be provided for the comfort of the inhabitants. Acoustical windows reduce noise transmission by 10 to 25 dBA more than standard glass window construction.

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Appendix H

Utilities Report

Telephone Service

994A

Telephone service to the Park would be provided by Pacific Telephone and Telegraph and would be served from their facilities located at Blanken Ave. and Bayshore Blvd. Communications with Mr. L. L. Farrell, Jr. of P.T. & T.[1] indicate that they have adequate room for switching equipment in their building on Third Street and Paul Ave. and conduits already exist from this point to a connection point on Blanken Ave. On-site installation of conduit would be concurrent with the undergrounding of the other utilities and only the interconnection in the Blanken Ave. area would cause a disruption of traffic.

---

[1] Letter June 30, 1975, on file with Department of City Planning.

PUBLIC SERVICES

a. Electricity and Gas

The proposed entire complex will require an average of about 6,720,000 KWH/mo. or 6.0 KWH/s.f.of interior floor space per month. Figure includes parking lighting for 653,800 sq. ft. of parking area. Total connected load will be 18,000 KVA. Service will be provided from P.G.&E. mains in the area with incoming service voltage to be determined. Building transformers will be provided at each structure located either in underground vaults or within building complex itself. Consumption figures assume 100% occupancy of the building space.

Daily and annual load distributions for electrical consumption are shown in graphic form accompanying this report, Figs. 1 and 2, with a total variation from maximum to minimum consumption of 40% with winter consumption being the least. Buildings will be completely air conditioned, which will be arranged on an economizer system, to reduce electrical consumption. Variation of Site usage into four distinct different occupancies provides 24 hour occupancy usage when at least one of the facilities is operating.

Total air conditioning connected load is estimated to be 3,675 tons. (A ton of air conditioning being the capacity to extract 12,000 Btu/hr. excess heat from the conditioned space.) (Btu: British Thermal Unit-quantity of heat required to raise one pound of water one degree Fahrenheit at sea level.)

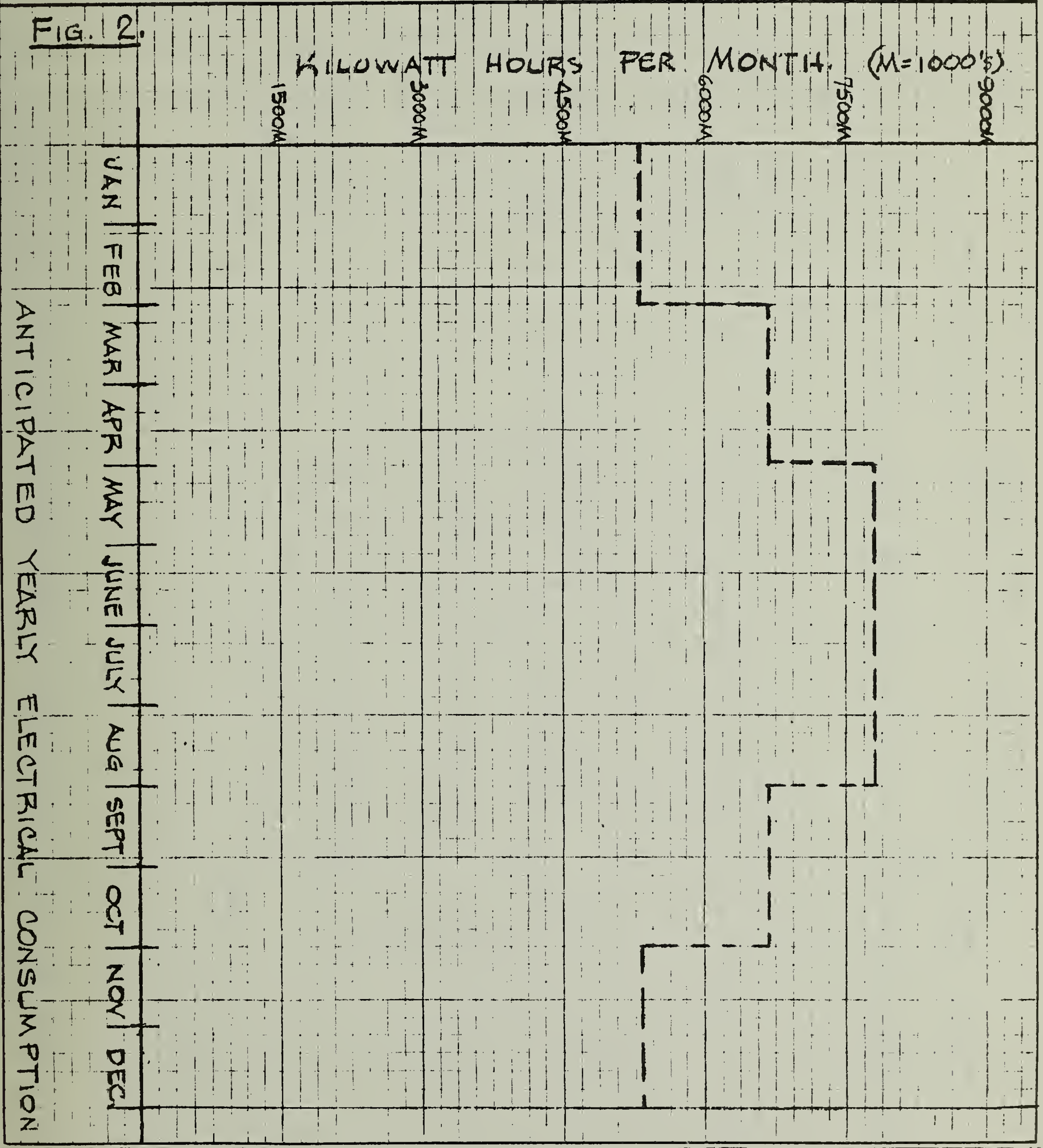
The proposed complex would be heated by natural gas. Maximum consumption would be 27,670 cu. ft. per hour, with a total connected load of 28,300 cu. ft. per hour. The apparent difference comes from the fact that the maximum demands of each of the component parts do not peak simultaneously. Average consumption would be 8,600 cu. ft. per hour, or 0.0077 cu. ft. per hour per sq. ft. space. (7.7 Btu per hour per sq. ft.) Peak hourly and average hourly gas consumption curves, Fig. 3, and an anticipated annual consumption bar graph, Fig. 4, accompany this report. Theoretically, gas consumption will vary from 0 on a warm summer day when no cooking is occurring to the maximum demand of 28,300 cu. ft. per hour should all connected equipment operate simultaneously on a design temperature day, with all cooking and domestic water heating demands at maximum.

NB -- Calculations for energy consumption are on file with City Planning Department

PROJECT SAN FRANCISCO EXECUTIVE PARK DATE JULY 29, 1975 BY RRA.

DEPT. SUBJECT ENERGY CONSUMPTION SHEET 8 OF 14

FIG. 2.



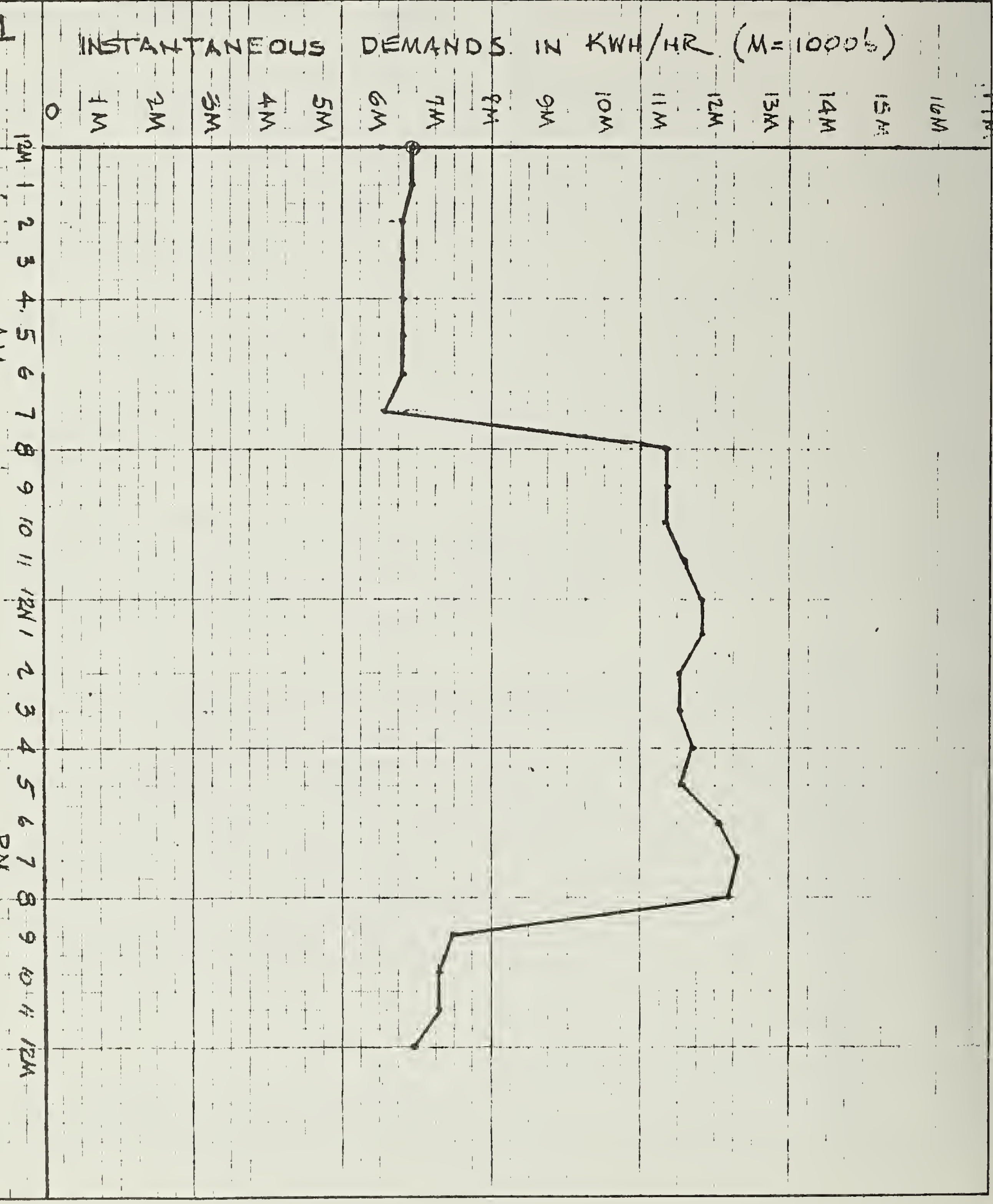
ANTICIPATED YEARLY ELECTRICAL CONSUMPTION

YANOW AND BAUER - CONSULTING ENGINEERS

PROJECT SAN FRANCISCO EXECUTIVE PARK DATE JULY 28, 1975 BY. RRA

DEPT. SUBJECT ENERGY CONSUMPTION SHEET 7 OF 14

FIG. 1



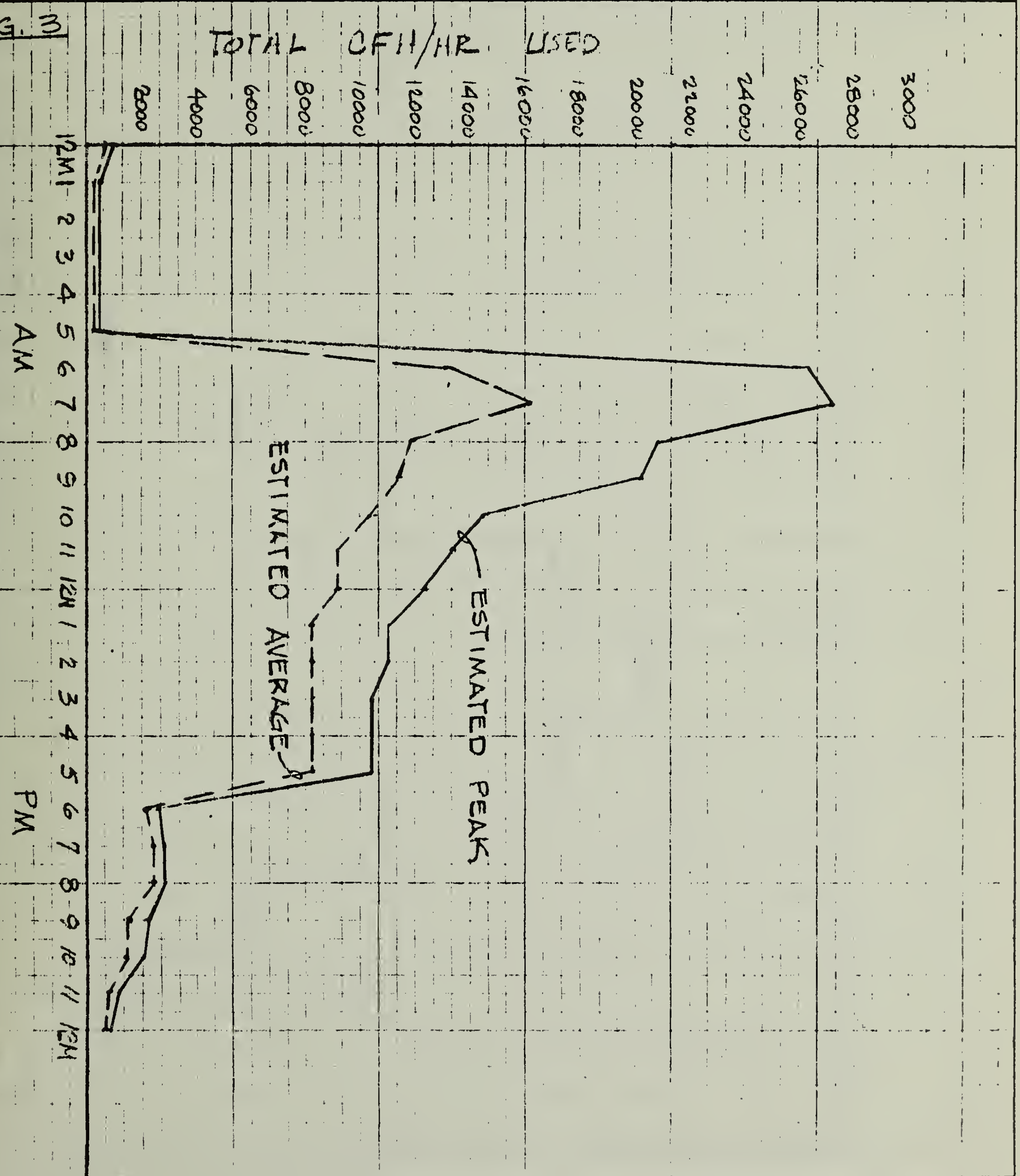
ANTICIPATED DAILY ELECTRICAL CONSUMPTION CURVE
(MARCH 21 & SEPTEMBER 21)

YANOW AND BAUER - CONSULTING ENGINEERS

PROJECT SAN FRANCISCO EXECUTIVE PARK DATE JULY 29, 1975 BY. RRA

DEPT. ______ SUBJECT ENERGY CONSUMPTION SHEET 13 OF 14

FIG. 3



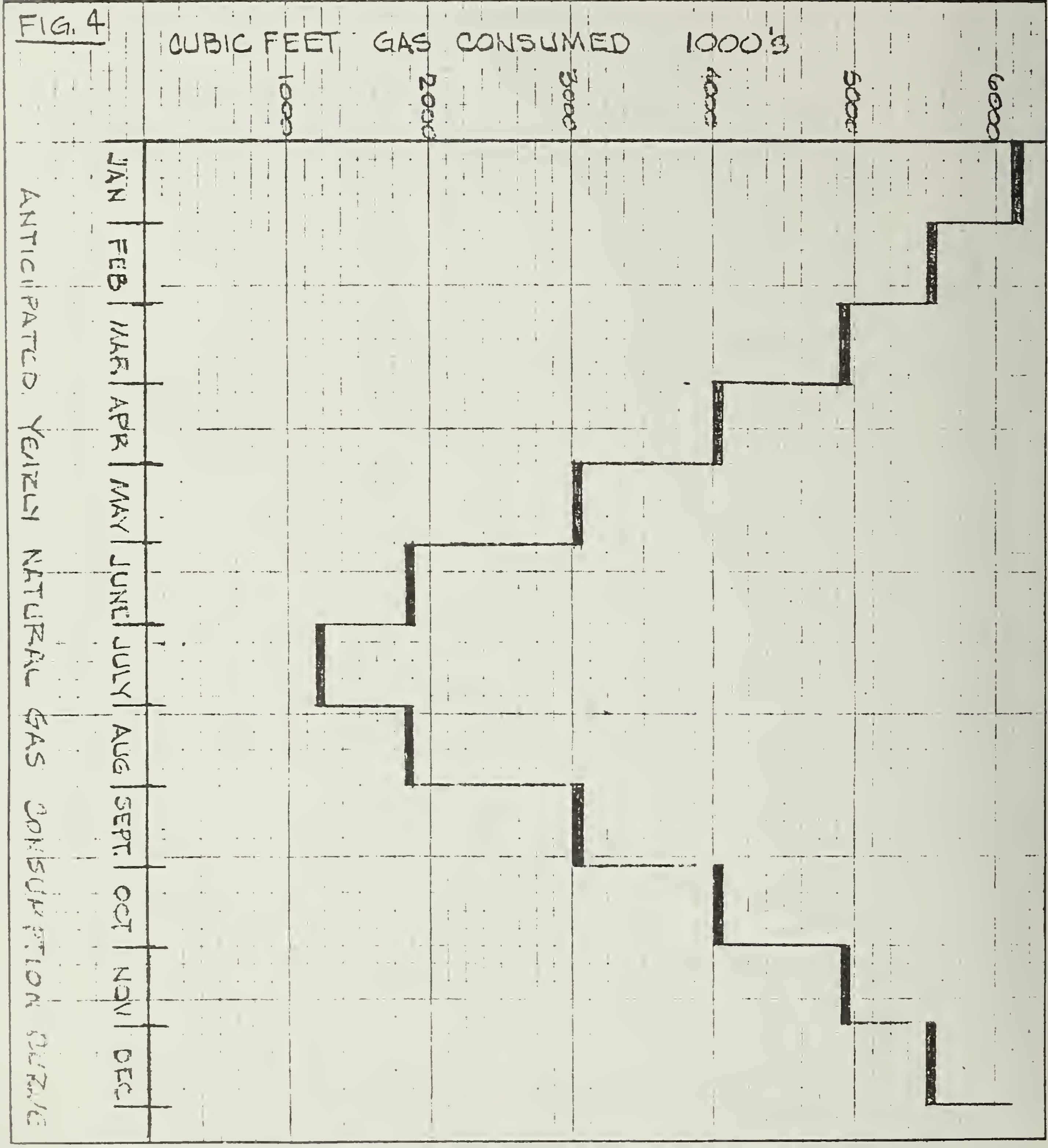
ANTICIPATED DAILY NATURAL GAS CONSUMPTION

YANOW AND BAUER - CONSULTING ENGINEERS

PROJECT SAN FRANCISCO EXECUTIVE PARK DATE JULY 29, 1975 BY RRA.

DEPT. ______ SUBJECT ENERGY CONSUMPTION SHEET 14 OF 14

FIG. 4



ANTICIPATED YEARLY NATURAL GAS CONSUMPTION CURVE

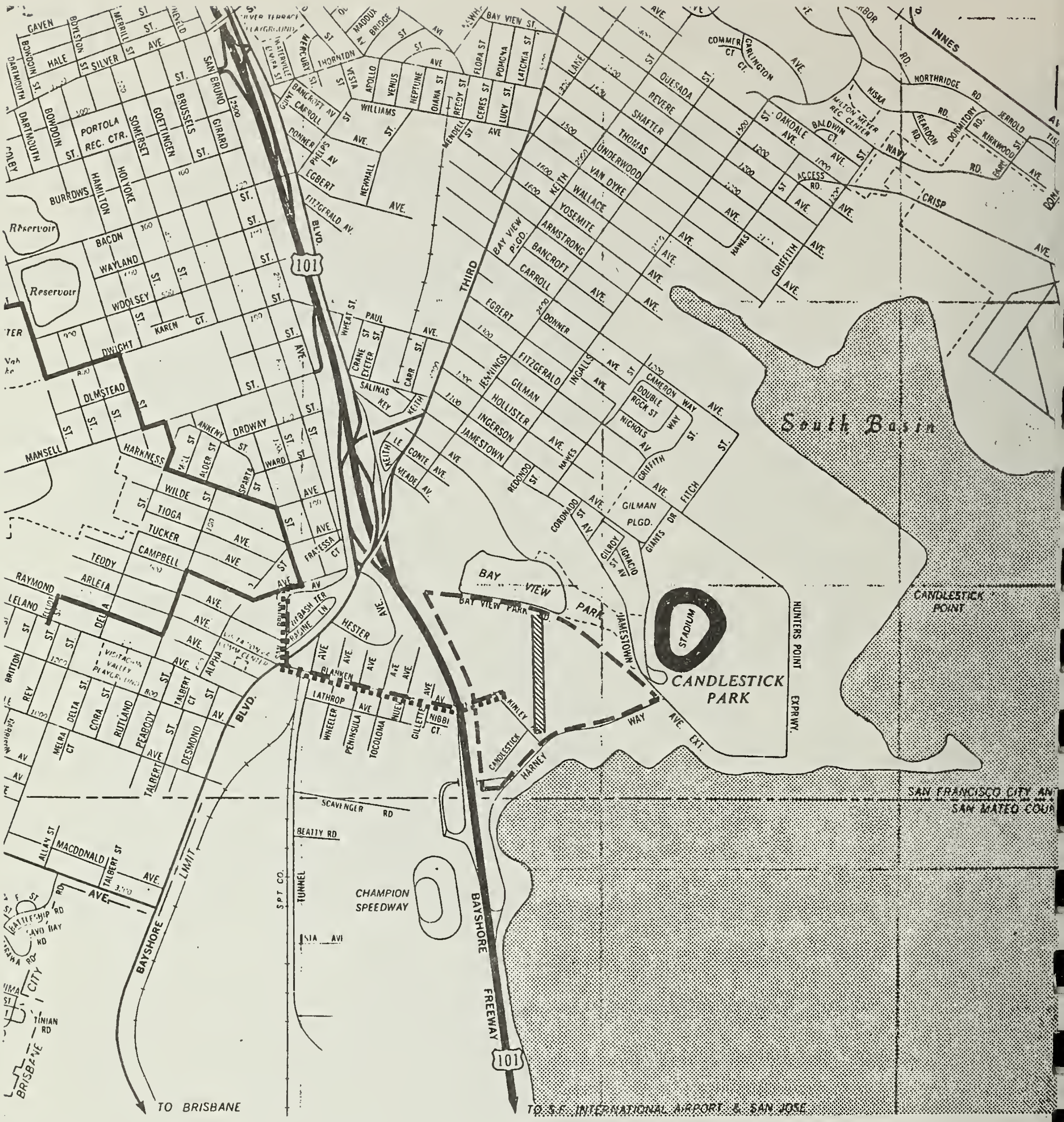
WATER SERVICE

At the present time, there are no water facilities on the site. An existing 8" main located in Blanken Avenue east of the Bay Shore Freeway can provide service to Phases 1, 1A (lower portion) and 2. (Figure H-1) This main's source is the University Mound Reservoir (El. 172 ft.) and provides service to areas from El. 0 (75 Psi) to El. 70 (44 Psi). When Phase 1A (upper portion) and Phase 3 are developed, an alternate water source will be needed because University Mound Reservoir cannot serve these upper areas. At that time, it is anticipated that a line be constructed from a connection point at Campbell Ave. and Goettigen St. to the project site as indicated on the attached map. This 12 inch line's source would be the Sunset Reservoir (El. 385 ft.) and will provide service from El. 70 (134 Psi) to El. 280 (45 Psi). Discussion with Jim Cooney of the San Francisco Water Department indicates that the line indicated as a connection point will be engineered and constructed as part of a 1972 bond issue and should be completed by the time the development needs service.

The project's ultimate average usage for the facilities and irrigation is approximately 283,000 gallons per day with a peak of 330,000 gallons per day. Preliminary discussions with San Francisco Water Department indicate that there is an adequate supply for this project based on the proposed phasing of the water scheme.

Alternate Development Scheme

If there is a desire to develop the two buildings in the upper portion of Phase 1A without the extension of the Sunset pipe line, this can be accomplished by constructing a pnenmatic system which will draw from the University Mound system. These two



········· EXISTING 8" MAIN (PHASE 1, 1A LOWER, 2)

— · — · PROPOSED 12" MAIN BY DEVELOPER (PHASE 1A UPPER, 3)

——— NEW 12" MAIN TO BE BUILT BY CITY

▨ 4' X 6'6" SEWAGE TUNNEL

Figure H-1 EXISTING/PROPOSED WATER MAINS AND SEWAGE TUNNEL

NORTH

buildings will require an average usage of 24,000 gpd with a peak demand of 27,000 gpd. (Figure H-2)

NB -- Water consumption calculations on file with City Planning Department

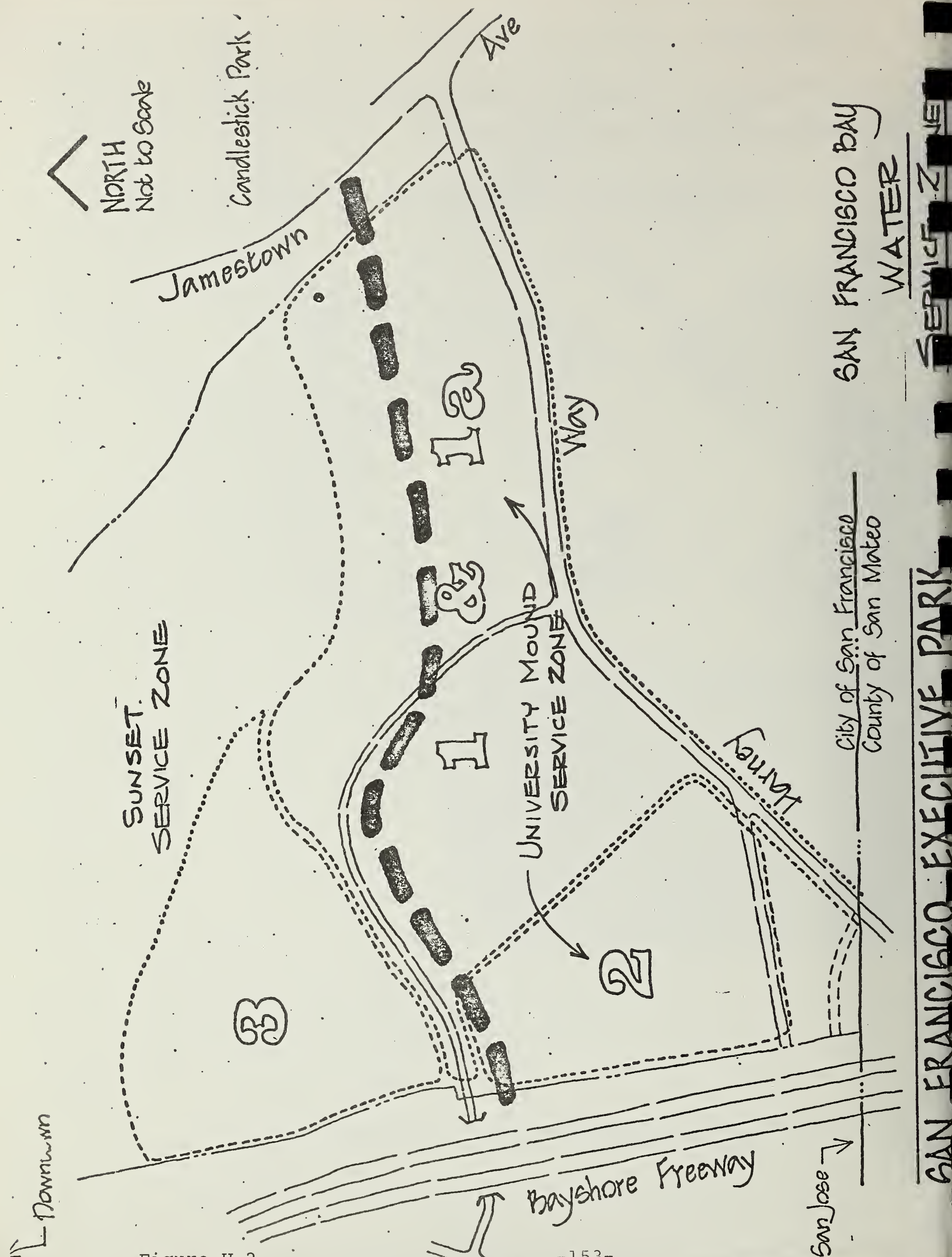

SAN FRANCISCO EXECUTIVE PARK
SAN FRANCISCO BAY
WATER
SERVICE ZONE
NORTH
Not to Scale
Candlestick Park
Jamestown
Ave
Way
1a
1
2
3
SUNSET
SERVICE ZONE
UNIVERSITY MOUND
SERVICE ZONE
Harney
City of San Francisco
County of San Mateo
Bayshore Freeway
San Jose
Downtown

Figure H-2

SEWAGE

At the present time, no dry weather sewage is being generated on the site. Previously, when housing existed on the site, sewage was transmitted through a 4 ft. x 6 ft. 6 in. sewage tunnel which lies under the site. This tunnel flows north under the hill and eventually interconnects with the Southest Sewage Treatment Facility. (Figure H-3)

It is planned that all sewage from the development will be channeled into the above mentioned sewage tunnel. The proposed plan will generate approximately 210,000 gallons per day of wastewater (0.21 MGD). Based upon the present 55 million gallons per day (MGD) peak hydraulic and processing capacity of the Southeast plant, this would mean an increase of 0.38%.

STORM WATER

The drainage basin that the development lies in is approximately 82 acres. Some of the original drainage structures from the period when housing occupied the site still exist. With the improvement of Harney Way a few years ago additional drainage facilities were installed. The existing drainage systems now carry off surface drainage into the Bay south of Harney Way. Based on the City's design criteria, the drainage basin at present represents a quantity of run-off of approximately 60 cubic feet per second.

Construction of the improvements will increase the surface water run-off. Building and parking areas represent some 25.4 acres of impervious surface and will increase surface run-off, based on the City of San Francisco's storm design[1] by 15 cubic feet per second.

Three approaches can be taken in the design of systems for the project.

Scheme 1

Since the site at present is not integrated in the San Francisco system, all surface waters including the development run-off could be channeled through a separate system into the Bay as is presently occurring.

---

[1] Calculations are based on storm water intensity curves and design criteria supplied by the Public Works Department, July 1975.

Scheme 2

A system would be designed which would pick up all surface waters in the development area and combine them with the development's sewage. This would be channeled through the SE Treatment Plant and could represent a peak wet weather flow of approximately 23 million gallons per day. All other run-off would be delivered by a separate system to the Bay.

Scheme 3

This design would encompass a total combined system, in which all surface run-off and sewage would be delivered to the SE Treatment plant. This combined system would represent a peak wet weather flow of approximately 50 million gallons per day. Preliminary discussions with Louis Vagadori of the City's Sanitary Engineering Department indicate that the capacity of the SE Treatment Plant is as follows:

Existing SE Plant (A primary plant with chemical aid)
29 million gallons per day average dry weather capacity.
55 " " " " peak hydraulic and processing capacity.

Proposed SE Plant Expansion
90-95 million gallon per day average dry weather capacity.
135-140 " " " " peak processing capacity.
160 " " " " peak hydraulic capacity.

This plant would be a secondary plant utilizing high purity oxygen activated sludge and should be completed by summer of 1980.

Scheme 1 would have very little effect on the SE Treatment Plant. Schemes 2 and 3, by combining the sewerage systems, would cause additional burdens on the SE Plant during wet weather. At present peak wet weather flow frequently exceeds the plant's capacity and excess untreated sewage is discharged into the Bay. Ultimate expansion of the plant will alleviate this condition.

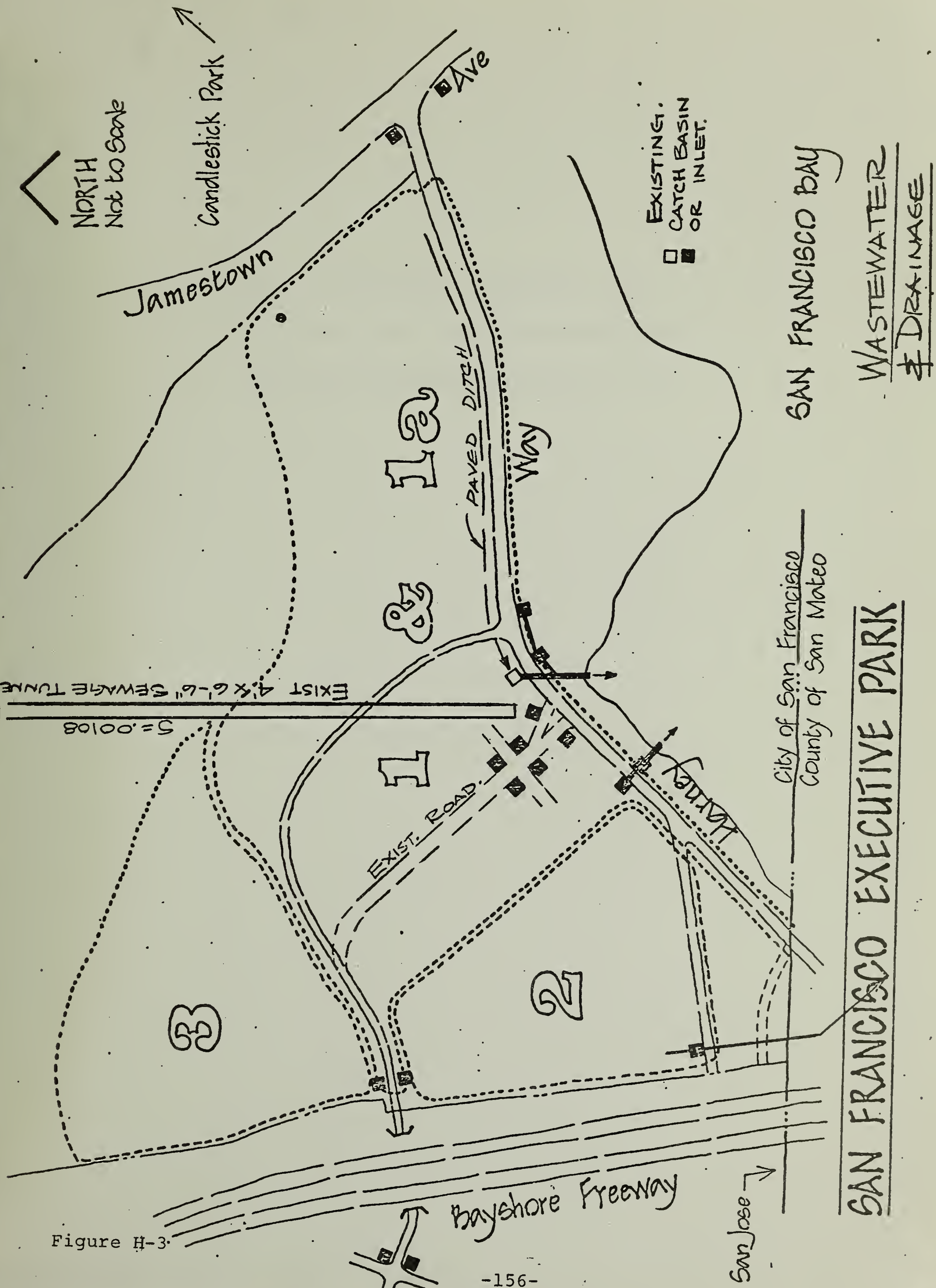

NORTH
Not to Scale
Candlestick Park
Jamestown
Ave
Existing
Catch Basin
or Inlet
San Francisco Bay
Wastewater
& Drainage
1a
&
1
2
3
Paved Ditch
Way
Harney
Exist. 4'x6'-6" Sewage Tunnel
S=.00108
Exist. Road
City of San Francisco
County of San Mateo
San Francisco Executive Park
Bayshore Freeway
San Jose
Downt n

Figure H-3

NB -- Engineer's Estimate of site
preparation and Utilities Construction
on file with City Planning Department

Appendix I

Economic Study

Keyser Marston Associates

Land Use Economics
Policy • Feasibility • Implementation
303 Sacramento Street
San Francisco, California 94111
(415) 398-3050

August 19, 1975

MEMORANDUM

TO: Piero Patri, Whisler-Patri

FROM: Keyser Marston Associates

SUBJECT: Economic Impact of the San Francisco Executive Park

This memorandum is intended to summarize the results of our analysis of the economic impact of the San Francisco Executive Park to be incorporated in the project EIR. We estimated the employment and municipal cost/revenue implications of the project as presently proposed by the Yerby Corporation, and compared the results with alternative development schemes, including office park projects developed under a 40-foot height limit, a residential project, and an industrial project. In each case, we were concerned with the impact of development as compared to current site conditions. The estimates are based on the most recent economic data available concerning market trends in San Francisco and the Bay Area.

Conclusions drawn from our analysis can be summarized as follows:

-- The proposed San Francisco Executive Park would generate approximately 220 construction jobs over a projected six year building period.

-- Permanent employment for a typical year after completion of the proposed project is estimated at approximately 4,900 jobs.

-- The majority of permanent jobs generated by the San Francisco Executive Park for which minority persons living in the immediate area of the proposed project are qualified would be clerical and service positions.

-- Increases in annual municipal operating costs due to development of the San Francisco Executive Park are estimated at $105,000+ (1975 dollars) for police and fire protection, sanitary sewerage, street maintenance and cleaning, street lights and traffic signals. Annual storm drainage maintenance costs would be dependent upon the system design.

-- Annual municipal tax revenues generated by the San Francisco Executive Park are estimated at $1,785,000 (1975 dollars), including property taxes, employer's payroll expenditure taxes, sales taxes and hotel room taxes. The project site currently generates city property tax revenues of approximately $7,000.

-- Both construction employment and permanent employment after development completion are affected by land use and building area square footage. The proposed development would generate higher average yearly construction and permanent employment as compared to the development alternatives under consideration.

-- Permanent employment varies in occupational distribution by development alternative. The proposed development and alternative 1B would generate the most jobs for which minority persons living in the area of the project site are qualified.

-- In general, municipal cost increases would not vary significantly between the proposed development and the development alternatives, with the following exceptions: the residential project would result in higher police protection cost increases; the industrial project would result in a significant reduction in annual municipal cost increases for all urban services due to its low employment level and lack of residential population.

-- Annual municipal revenues vary between development alternatives depending primarily upon land use and employment levels. The proposed development is expected to generate greater municipal tax revenues as compared to the development alternatives under consideration.

The remainder of this memorandum presents our findings in further detail.

PROJECT DESCRIPTION

The San Francisco Executive Park comprises some 73 acres of land lying between U.S. Highway 101 and Candlestick Park in the southeasternmost portion of the City of San Francisco. The project as presently proposed by the Yerby Corporation includes the following land uses and building area square footage:(1

Land Use	Building Area Square Footage
Office-High Rise	507,000
Office-Low Rise	356,640
Restaurant*	78,288
Hotel	110,000
Shops	61,400
Total Project	1,113,328

---

*Includes convention facilities.

The building period of the total project is estimated at six years.

---

1) The developer has estimated that the project will have typical office rents of 73¢ per square foot and that hotel rooms will cost $25 - $35 per night.

Table 1

PERMANENT EMPLOYMENT
BY LAND USE AND OCCUPATION
SAN FRANCISCO EXECUTIVE PARK

	Office					Total	
	Workers	Maintenance	Restaurant	Hotel	Shops	No.	%
White Collar Occupations							
Professional/Technical	130	1	2	4	3	140	3
Managers/Officers/Proprietors	950	8	47	42	30	1,077	22
Clerical	2,073	3	2	23	20	2,131	43
Sales	277	1	2	--	30	810	16
Blue Collar Occupations							
Service	259	--	157	107	23	546	11
Craftsmen	86	41	2	8	11	148	3
Operatives	--	14	2	4	15	35	1
Other	43	1	--	4	4	52	1
Total	4,318	69	224	192	136	4,939	100%

Source: Keyser Marston Associates

CONSTRUCTION EMPLOYMENT

Construction employment attributable to the proposed San Francisco Executive Park over the projected six year building period is estimated at an average of 220 employees per year. Construction employment was derived as follows:

Total value of new improvements excluding land (1975 dollars)	$48,300,000(1
On-site labor share of improvement value @ 30%	$14,500,000
Total man weeks of construction labor at $310/week	46,800
Total man years of construction labor at 35 weeks/year	1,300
Average yearly construction employment over six years	220

PERMANENT EMPLOYMENT

Permanent employment for a typical year after development completion is estimated by land use as follows:

Land Use	Sq. Ft.(2 Per Employee	Sq. Ft.	Total Employees
Office			
Office Workers	200	863,640	4,318
Maintenance Workers	12,500		69
Restaurant*	350	78,288	224
Hotel	572	110,000	192
Shops	450	61,400	136
Total Project		1,113,328	4,939

---

*Includes convention facilities.

Total permanent employment generated by the proposed San Francisco Executive Park is estimated at 4,939. Approximately 4,400 of the permanent jobs would be office-related employment with the remainder distributed among restaurant, hotel, and retail employment. A distribution of employees by occupation, as shown in Table 1, indicates that approximately 84% of the jobs would be white collar positions, with the remaining 16% representing blue collar workers.

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1) See Table 4.
2) Based on current architectural practice.

MINORITY EMPLOYMENT

In 1970, approximately 7,500 unemployed persons, largely a minority population, resided in the southeast sector of the City of San Francisco. Based on the 1970 Census of Population, the occupational distribution of unemployed minority persons throughout the metropolitan area is projected as follows:

White Collar Occupations	
Professional/Technical	5%
Managers/Officers/Proprietors	2
Clerical	16
Sales	4
Blue Collar Occupations	
Service	17
Craftsmen	14
Operatives	25
Other	17
TOTAL	100%

The majority of jobs generated by the San Francisco Executive Park for which minority persons living in the immediate area of the proposed project are qualified would be clerical and service positions.

MUNICIPAL COSTS

Capital and operating costs to the City of San Francisco for providing services to the proposed San Francisco Executive Park are estimated for a typical year after development completion. All costs are projected in 1975 dollars. In general, on-site and off-site capital improvements related to the proposed project would be provided by the developer, including roads and street lights, as well as the installation of sewers, water mains and storm drains to connect with the existing municipal systems.

Based on the current experience of each of the city departments involved, as well as the characteristics of the capital improvements provided by the developer, the following increase in municipal operating costs are estimated to result from development of the proposed San Francisco Executive Park:

Urban Service	Increase in Annual Municipal Operating Cost (1975 dollars)
Police Protection	$82,000
Fire Protection	Minimal
Sanitary Sewerage	$15,000
Water Service	Profitable operation paid for through charges for service.
Storm Drainage	Dependent upon system design.
Street Maintenance & Cleaning, Street Lights, & Traffic Signals	$8,000+

Note: For sources of data and estimates used, see Addendum, Table 1.

ADDENDUM

TABLE 1

SOURCES OF MUNICIPAL COST ESTIMATES

Urban Service	Increase in Annual Municipal Operating Cost (1975 dollars)
Police protection	\$82,000[1]
Fire protection	Minimal[2]
Sanitary sewerage	\$99,000[3]
Water service	Profitable operation paid for through charges for service.
Storm drainage	Dependent on system design[4]
Street maintenance & cleaning street lights & traffic signals	\$8,000+[5]

---

[1] Based on report in Appendix J.

[2] Based on letter from Gilbert G. Bendix, Superintendent of the Bureau of Engineering & Water Supply, San Francisco Fire Department, September 18, 1975.

[3] Based on recommendations of Stone & Youngberg, "Sewer Revenue Program Study", pp. 54-55, using fee schedule for 1981-82. Fees are set to cover costs.

[4] Actual storm drainage system not yet determined. If storm drainage were channeled to water pollution control plant, rate would be the same as Item 3.

[5] Estimate given by Dick Evans, Department of Public Works, September 14, 1975, phone conversation.

Police protection would be provided by the San Francisco Police Department at an annual operating cost of $82,000. Police department operating expenditures are estimated based upon a $520 cost per incident for which a police report would be filed in a one year period. The police department has estimated an average annual increase of 157 incidents per year following development completion.

The San Francisco Fire Department has indicated that no substantial increase in fire protection costs would be generated by the San Francisco Executive Park.

Operating costs of the sanitary sewage treatment plant and collector sewers attributable to the San Francisco Executive Park are estimated at an annual cost of $15,000, based on a projected volume of 75 million gallons of sewage per year at an annual cost of $.02 per 100 gallons.

Water service costs are not projected because the San Francisco Water Department is able to operate on a profitable basis through charges for water services according to the water volume demanded.

Since the site of the San Francisco Executive Park is not connected to the San Francisco drainage system at present, all surface water including development run-off could be channeled through a separate system into the Bay as is presently occurring. This would not represent a public cost increase. Alternatively, a system could be designed which would pick up surface waters of the development area, combine them with the development's sewage being channeled to the city's sewage treatment plant, and thus increase the annual municipal operating costs attributable to the San Francisco Executive Park. At the present time, a decision has not been reached over the storm drainage system design.

An increase in street maintenance and cleaning, and street lighting operating costs is expected to be minimal because the public streets in the proposed development currently exist and are serviced by the City of San Francisco. The realigning and repavement of Blanken Avenue and the widening of Harney Way are not expected to increase municipal operating costs significantly. Traffic signal operation and maintenance at two intersections with Harney Way would result in an increased municipal cost of $8,000 per year, assuming four signal standards per intersection. The City of San Francisco Public Works Department estimates the annual operating and maintenance per signal standard at $1,000 in 1975 dollars.

MUNICIPAL REVENUES

Municipal tax revenues generated by the San Francisco Executive Park are estimated for a typical year after development completion, as follows:

Tax Revenue Source	Estimated Annual Tax Revenue (1975 dollars)	City Share	City of San Francisco Annual Tax Revenue (1975 dollars)
Property Tax	$1,800,000	58.0%[1]	$1,044,000
Employer's Payroll Expenditure Tax	494,000	100.0%	494,000
Sales Tax	788,000	15.4%[2]	121,000
Hotel Room Tax	126,000	100.0%	126,000
Total	$3,208,000		$1,785,000

---

1) Property taxes are collected for the City and County of San Francisco, the San Francisco Unified School District, BART and other miscellaneous special districts. The City of San Francisco receives $7.40 per $100 of assessed valuation, equivalent to 58% of the total property tax rate of $12.75.

2) While the State of California collects a 6½% sales tax on goods sold in the City of San Francisco, only 1% of the total tax is returned to the City, equivalent to 15.4% of total sales tax revenues collected by the state.

Property tax revenues are projected on the basis of a $12.75 tax rate per $100 of assessed valuation at 25% of the market value of the proposed project. The aggregate market value of land and improvements in the San Francisco Executive Park is estimated at $56,800,000(3 in 1975 dollars. Annual property tax revenues are projected at $1,800,000, of which the City of San Francisco could expect to receive $1,044,000 (58%) annually upon development completion. The project site currently generates city property tax revenues of approximately $7,000.

Employer's payroll expenditure tax generated by the San Francisco Executive Park is calculated based upon a projected total payroll expense of $79,700,000 in 1975 dollars. This expense was multiplied by 1% to derive a maximum payroll expense tax revenue and multiplied again by 62% to estimate "probable" revenue from this source, where 62% of employee's services are attributed to efforts rendered in San Francisco (based on tax revenues received in fiscal year ending June 30, 1973). The payroll expense levy is imposed only on that portion of an employer's payroll expense attributable to work performed or services rendered in San Francisco.

Sales tax revenues of 6½% to be collected by the State of California are based on 139,688 square feet of restaurant and small shop space in the San Francisco Executive Park, operating at an average taxable sales volume of $12,100,000. Annual sales tax revenues to the City of San Francisco generated by the proposed project are estimated at $121,000, equivalent to a 1% sales tax, or 15.4% of all sales tax revenues to be collected by the State of California.

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3) Market value is assumed equal to development cost.

Table 2

COMPARISON OF PROPOSED DEVELOPMENT WITH DEVELOPMENT ALTERNATIVES

	Proposed Development	Development Alternatives				
		1B	1C	2	3	4
Average Yearly Construction Employment Over Six Years	220	210	165	170	65	--
Permanent Employment After Development Completion By Land Use						
Office						
Office Workers	4,318	4,318	3,310	--	324	--
Maintenance Workers	69	69	53	--	5	--
Restaurant	224	224	251	--	--	--
Hotel	192	192	178	--	--	--
Shops	136	136	--	1,210	--	--
Industrial	--	--	--	--	831	--
Total	4,939	4,939	3,792	1,210	1,160	--
Permanent Employment After Development Completion By Occupation						
White Collar Occupations:						
Professional/Technical	140	140	106	24	85	--
Managers/Officials/ Proprietors	1,077	1,077	826	266	122	--
Clerical	2,131	2,131	1,625	182	264	--
Sales	810	810	599	266	83	--
Blue Collar Occupations:						
Service	546	546	474	206	27	--
Craftsmen	148	148	106	97	168	--
Operatives	35	35	18	133	366	--
Other	52	52	38	36	45	--
Total	4,939	4,939	3,792	1,210	1,160	--

Source: Keyser Marston Associates

Hotel room tax revenues of 6% to be received by the City of San Francisco are derived based on 275 hotel rooms operating at 70% occupancy with average room rates of $30 per night. Hotel room tax revenues generated by the San Francisco Executive Park are estimated at $126,000.

DEVELOPMENT ALTERNATIVES

Employment and municipal cost/revenue implications of the proposed project are compared with alternative development schemes described by land use and building area square footage as follows:

Building Area Sq. Ft. By Land Use	Proposed Development	Development Alternative				
		1B	1C	2	3	4
Office-High Rise	507,000	---	---	---	---	---
Office-Low Rise	356,640	863,640	662,000	---	64,700	---
Restaurant*	78,288	78,288	88,000	---	---	---
Hotel	110,000	110,000	101,520	---	---	---
Shops	61,400	61,400	---	544,500	---	---
Residential	---	---	---	840,000	---	---
Industrial	---	---	---	---	582,300	---
Total	1,113,328	1,113,328	851,520	1,384,500	647,000	---

---

*Includes convention facilities.

Development alternative 1B differs from the proposed alternative in office building height only. The proposed development includes two 15-story office towers in combination with low-rise office space and a 275-room hotel. Alternative 1B limits the maximum building height to 6-stories. Alternative 1C limits the maximum building height to 3-stories and reduces the hotel facilities to approximately 250 rooms. Small shop space is also eliminated in Alternative 1C. Alternative 2 is primarily a residential project including 700 dwelling units, a 5-acre commercial site, an elementary school and recreation site. Alternative 3 proposes light industrial uses including office and warehouse space. Alternative 4 assumes the site would remain as undeveloped open space.

Both construction employment and permanent employment after development completion are affected by land use and building area square footage. Table 2 presents the average yearly construction employment over a six year building period by development alternative. The proposed development would generate higher average yearly construction employment, estimated at 220 jobs, as compared to the development alternatives under consideration.

Table 3

COMPARISON OF PROPOSED DEVELOPMENT WITH DEVELOPMENT ALTERNATIVES

(1975 dollars)

	Proposed Development	Development Alternatives				
		1B	1C	2	3	4
Annual Municipal Cost Increase By Urban Service						
Police Protection	$ 82,000	$ 82,000	$ 82,000	$	$	$ --
Fire Protection	Minimal	Minimal	Minimal	Minimal	Minimal	--
Sanitary Sewerage	$ 15,000	$ 15,000	$ 12,000	$ 15,000	$ 3,000	--
Water Service	(Profitable operation paid for through charges for services.............)					
Storm Drainage	(Dependent upon system design.......................................)					
Street Maintenance and Cleaning, Street Lights, Traffic Signals	$ 8,000+	$ 8,000+	$ 8,000+	$ 4,000+	Minimal	--
Annual Municipal Tax Revenues*						
Property Tax**	$1,044,000	$1,033,000	$ 821,000	$ 782,000	$335,000	$7,000
Employer's Payroll Expenditure Tax	494,000	494,000	380,000	49,000	102,000	--
Sales Tax	121,000	121,000	88,000	381,000	--	--
Hotel Room Tax	126,000	126,000	117,000	--	--	--
Total	$1,785,000	$1,774,000	$1,406,000	$1,212,000	$437,000	$7,000

---

* Revenues to City of San Francisco only.

**Revenues generated by land and improvements only.

Source: Keyser Marston Associates

Permanent employment is projected to remain constant at approximately 4,900 jobs for the proposed development and alternative 1B, as shown in Table 2. Permanent employment is reduced to approximately 3,800 in alternative 1C and approximately 1,200 in alternatives 2 and 3. Alternative 4 would neither generate construction jobs, nor permanent jobs.

Permanent employment varies in occupational distribution by development alternative. Table 2 presents the numerical distribution of employment by occupation for each development alternative. White collar occupations decline from 84% of the total permanent employment in the proposed development and alternatives 1B and 1C, to 61% in alternative 2, and 48% in alternative 3. Nevertheless, the proposed development and alternative 1B generate the most jobs for which minority persons living in the immediate area of the project site are qualified.

A comparison of annual municipal cost increases and annual municipal revenues by development alternative is shown in Table 3. In general, annual municipal cost increases would not vary significantly between the proposed development and development alternatives 1B and 1C. Police protection cost increases resulting from development alternative 2 reflect the increased police service needs of residential development. Development alternative 3, reflects a significant reduction in annual municipal cost increases due to its low employment level and lack of residential population. No significant municipal cost increases are identified for alternative 4.

Annual municipal revenues vary between development alternatives depending primarily upon land use and employment levels as shown in Table 3. The proposed development is expected to generate greater municipal tax revenues, estimated at $1.785 million annually, as compared to the development alternatives under consideration.

Table 4

SAN FRANCISCO EXECUTIVE PARK
CONSTRUCTION COST ESTIMATES

	Use	Sq. Ft.	Cost
Phase I	Office	138,360	$5,534,400
	Restaurant	14,400	720,000
Subtotal			6,254,400
Phase 2	Office	170,880	6,835,200
Phase 3	Hotel	110,000	5,500,000
	Restaurant	63,888	3,194,400
Subtotal			8,694,400
Phase 4	High Rise Office	507,000	22,815,000
	Low Rise Office	47,400	1,896,000
	Retail	61,400	1,842,000
Subtotal			$26,553,000
TOTAL			$48,337,000

Source: Keyser Marston Associates

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Land Use Economics
Policy • Feasibility • Implementation
303 Sacramento Street
San Francisco, California 94111
(415) 398-3050

April 7, 1976

MEMORANDUM

TO: Piero Patri, Whisler-Patri

FROM: Keyser Marston Associates

SUBJECT: Economic Impact of the San Francisco Executive Park

The purpose of this memorandum is to respond to the following requests for additional economic information made by the City of San Francisco upon its review of the EIR on the San Francisco Executive Park:

1. The economic impact of the hotel planned for the San Francisco Executive Park on San Mateo County peninsula hotels and motels located in the vicinity of the San Francisco Airport.

2. The economic impact of the office space proposed for the San Francisco Executive Park on downtown San Francisco office space.

This memorandum is not intended as a market analysis; rather it compares estimates of the magnitude of the market with estimates of the magnitude of uses planned for the San Francisco Executive Park project. A summary of our findings is as follows:

-- The ratio of projected room receipts for the proposed 272 room hotel to the projected room receipts of San Mateo County is estimated to be within a range of 4.5%-5.0% by 1980 and to fall to a range of 3.6%-4.3% by 1985.

-- The ratio of projected office space demand for the project to the projected office space demand for downtown San Francisco is estimated to be within a range of 0.07%-0.09% by 1977 and to fall to .04%-.05% by 1981.

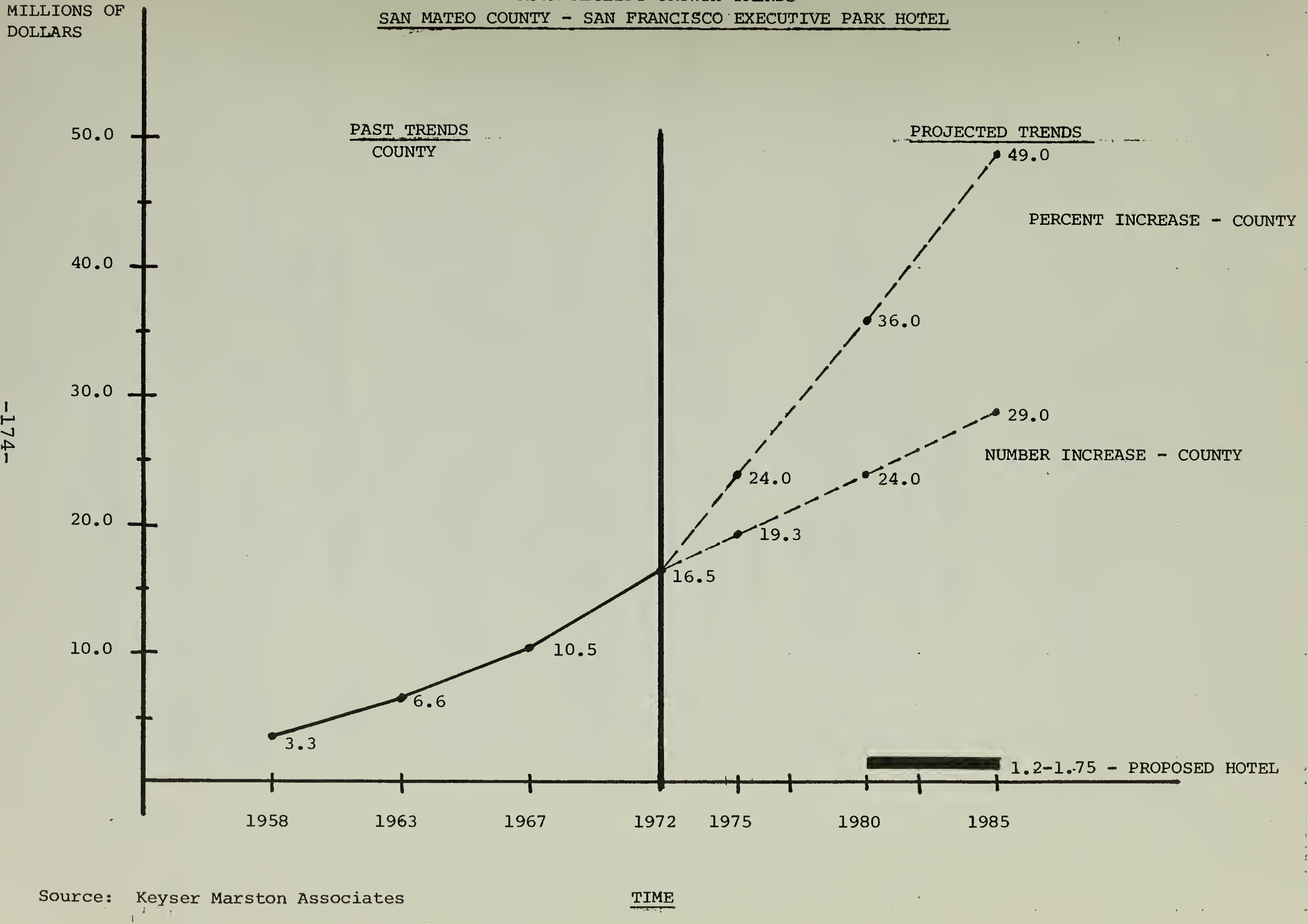
Hotel Impact

Current Inventory and Projected Trends

An examination of room receipts and number of establishments as reported by the U.S. Census of Business indicates a substantial increase in the amount of room receipts over the past 15 years.

Table 1

ROOM RECEIPT GROWTH TRENDS
SAN MATEO COUNTY - SAN FRANCISCO EXECUTIVE PARK HOTEL



Source: Keyser Marston Associates

HOTEL/MOTEL RECEIPTS

San Mateo County	1958	1963	1967	1972
Number of Establishments	108	87	102	100
Room Receipts ($1,000)	$3,319	$6,642	$10,596	$16,480

Source: U.S. Census of Business

Based upon these past trends, hotel/motel room receipts have been projected through 1985 using two projection methods: (1) an average percentage increase and (2) an average annual dollar increase. Table 1 graphically illustrates these two projection techniques. By 1985, total room receipts for San Mateo County are estimated to be within the range of $29,000,000 to $49,000,000.

San Francisco Executive Park Hotel:

Annual room receipts of roughly $2,500,000 have been estimated for the proposed 272 room hotel. This annual figure is based upon competitive room rates and estimates of occupancy levels based on past market studies and analysis of current market inventory.

Approximately 10,000-15,000 travelers arrive daily at San Francisco International Airport. Based upon past studies of the Peninsula hotel market, it is estimated that the proposed 272 room hotel will derive 50%-70% of its occupants from airport travelers. Applying this range to the estimated $2,500,000 annual receipts figure, the proposed hotel's expected share of airport travelers is estimated to fall within a range of $1.2-$1.75 million annually. This is also graphically displayed in Table 1. Assuming a completion date of 1980, Table 2 compares projected room receipts for the hotel to projected room receipts for San Mateo County.

Table 2

PROJECTED HOTEL/MOTEL ROOM RECEIPTS

	1980		1985	
	Low	High	Low	High
San Mateo County (millions $)	24.0	36.0	28.0	49.0
Project: 50%-70% (millions $)	1.2*	1.75	1.2	1.75
Ratio: Project-San Mateo County (%)	5.0	4.9	4.2	3.6

---

* Estimated in 1975 dollars
Source: Keyser Marston Associates

The ratio of projected 1980 and 1985 room receipts for the San Francisco Executive Park Hotel to the San Meteo County projections for the same two years is within a 4.8%-5.0% range for 1980 and decreases to 3.6%-4.3% by 1985.

Office Impact

Inventory and Projected Trends: San Francisco CBD

An examination of office building space in downtown San Francisco indicates a steady increase during the past 15 years.

San Francisco Downtown Office Building Space

	1960	1965	1970	1974
Office Building Space (millions of sq. ft. gross)	27.0	33.2	42.3	50.0

Source: Keyser Marston Associates

Following the methdology developed by Keyser Marston Associates for use in the report done for SPUR, Impact of Intensive High Rise Development on San Francisco, office building space for downtown San Francisco has been projected through 1985. This projection, shown in Table 3, has a range of 55-70 million sq. ft. by the year 1985.

San Francisco Executive Park Office Space:

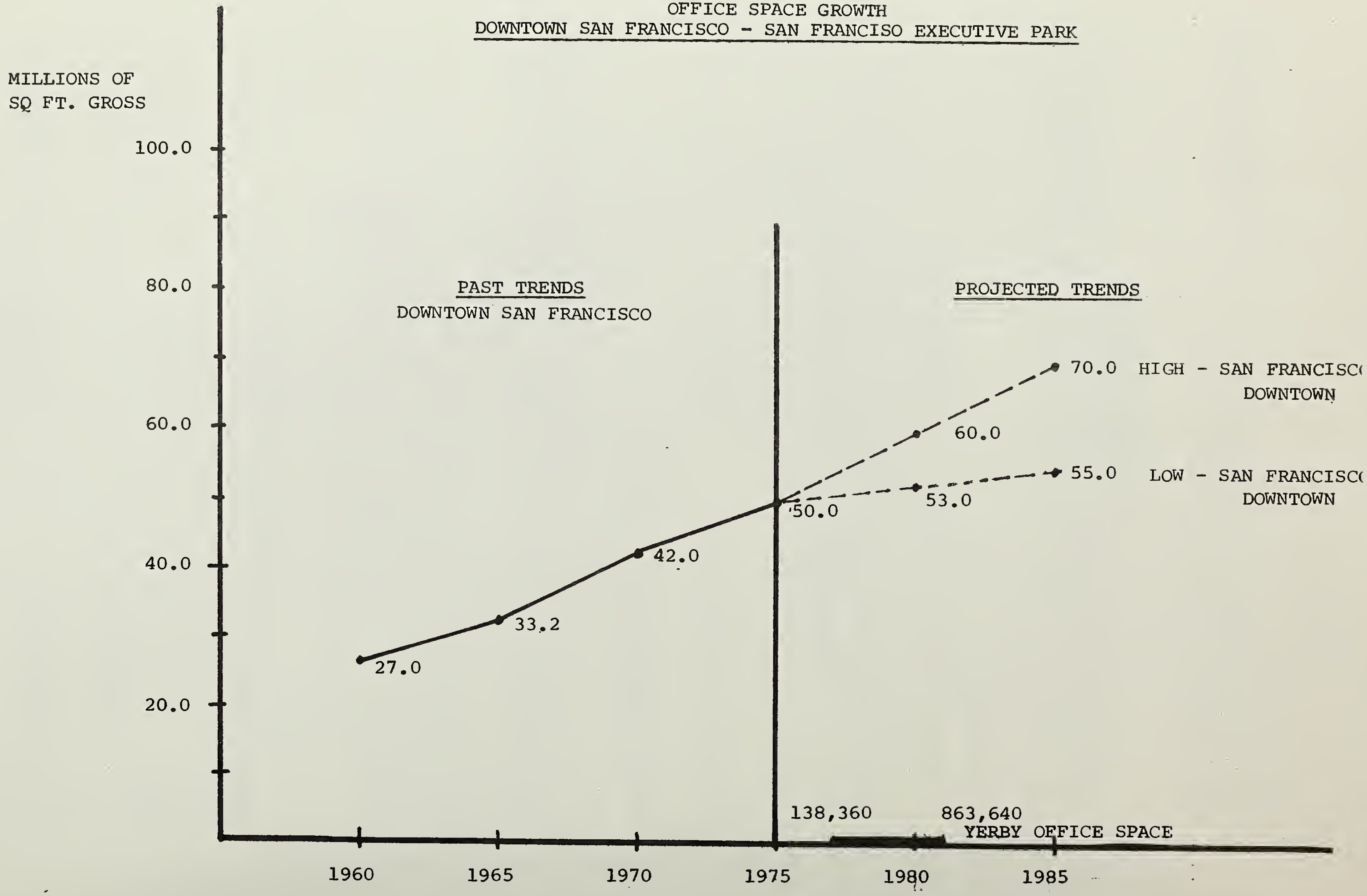
The proposed San Francisco Executive Park office complex calls for 863,640 sq. ft. to be developed in the following manner:

San Francisco Executive Park Office Space Phasing

Phase	Square Footage	Cumulative
Phase I (1976-1977) Office	138,360	138,360
Phase Ia (1978-1979) Office	170,880	309,240
Phase II (1978-1981) Hotel	-0-	309,240
Phase III (1979-1981) Office	554,400	863,640
	863,640	

Table 3

OFFICE SPACE GROWTH
DOWNTOWN SAN FRANCISCO - SAN FRANCISO EXECUTIVE PARK



Source: Keyser Marston Associates

This is graphically displayed in Table 3. Based on previous studies of the Peninsula office market, it is estimated that 15%-45% of future tenants in the San Francisco Executive Park will be derived from either present occupants of downtown San Francisco buildings or those who would have located in downtown San Francisco in the future. (For purposes of estimation, a 30% figure has been used.) Applying a 30% figure to the proposed phasing plan, approximately 41,000 sq. ft. of the planned 138,360 sq. ft. will represent demand from downtown San Francisco tenants in 1977. This figure will increase to approximately 259,000 sq. ft. for the completed project by 1981.

Table 4 compares projected office building space for downtown San Francisco and projected office building space for the San Francisco Executive Park office project for the years 1977 and 1981.

Table 4

PROJECTED OFFICE BUILDING SPACE

	1977		1981	
	Low	High	Low	High
San Francisco Downtown (Millions of Sq. Ft.)	52.0	54.0	53.0	60.0
Yerby Project (Sq. Ft.)	41,500 (1		259,000 (1	
Ratio: Yerby Project - San Francisco Downtown (%)	0.07 -	0.09	0.04 -	0.05

---

1) Estimated by: 138,360 sq. ft. X 30% = 41,500
863,640 sq. ft. X 30% = 259,000

For the years 1977 and 1981, the ratio of office space in the project to office space in downtown San Francisco is less than 1%.

Keyser Marston Associates

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April 7, 1976

MEMORANDUM

TO: Whisler-Patri
Attention: Piero Patri

FROM: Keyser Marston Associates

SUBJECT: Addendum to Economic Impact Evaluation of the San Francisco Executive Park

This memo provides further information regarding the financial feasibility of the development alternatives that have been considered for the site of the San Francisco Executive Park. The development alternatives discussed are: multi family rental residential, single family sale residential, industrial, and lower intensity commercial office space.

Multi Family Rental Residential Development

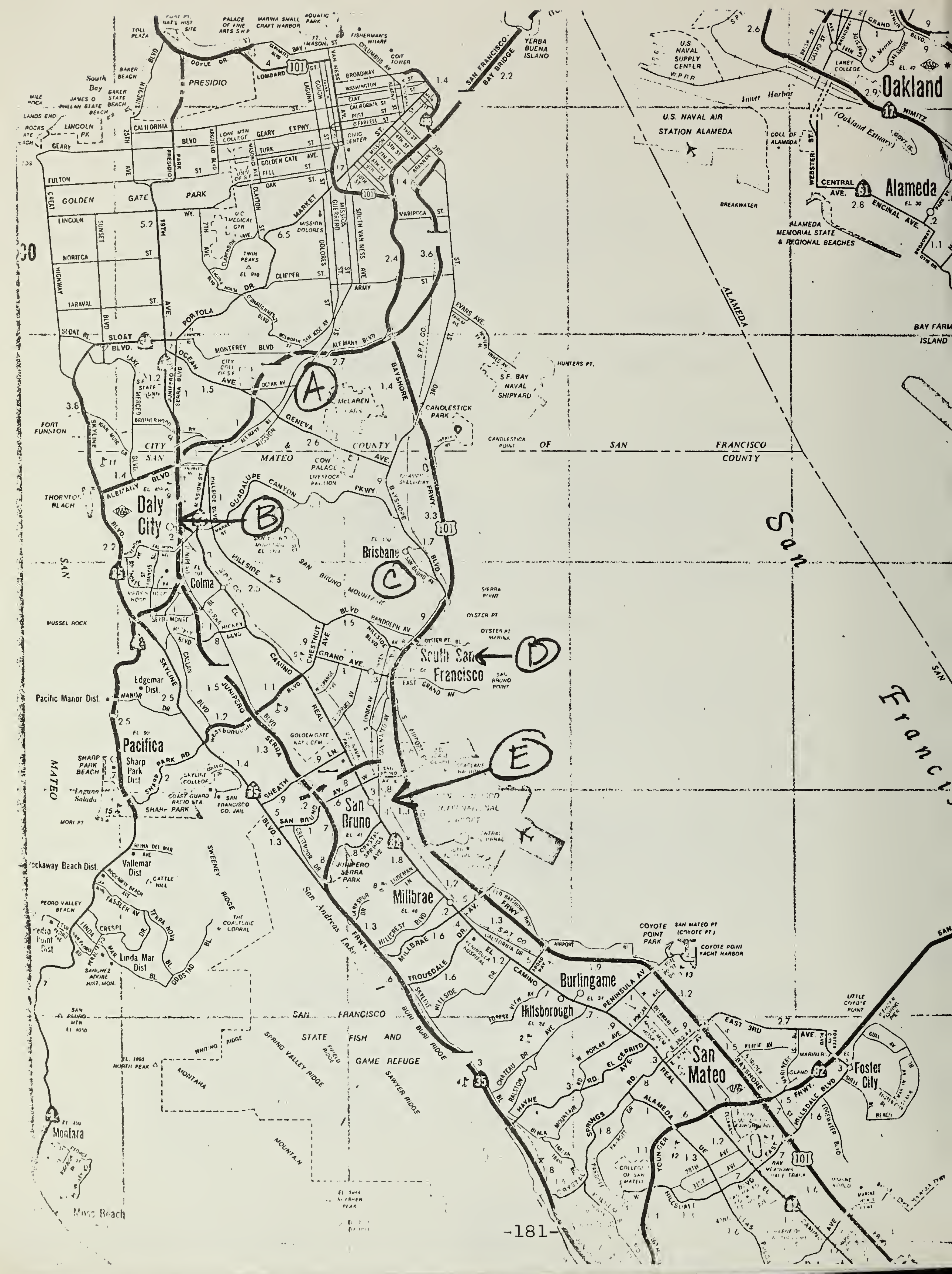
The map key and table following this page present a representative sample of current rents for multi family units in communities adjacent to the site. As shown, the rent levels range from a low of $180 a month to a high of $280 a month. The typical rents are in the $200 to $250 a month price range. The development cost per apartment unit will be at least $30,000. At $30,000 per unit the mortgage payment (principal and interest) will be about $3,000 per year ($2,700 interest $300 or less principal). The taxes will be approximately $1,000. The operating expenses, i.e. water, garbage, exterior utilities, repairs, maintenance, management, licenses, gardening and vacancy costs will be another $1,000 per unit. Total costs will be about $5,000 per unit prior to the developer receiving any return. Thus, the rents must be in the high $400's per month rent range. Compared with current rents in the area this is a major gap.

Thus it is concluded that to construct new apartments at the site within the current rent range would require the donation of the land and some other form of rent subsidy. The reason for the foregoing is that construction costs have increased at a rate that has far exceeded the increase in rents. Thus there is little or no residential rental unit construction at the current time. Discussions with lenders and developers have clearly established that in most situations it is not possible to build new multi family units at this point in time.

SAN FRANCISCO EXECUTIVE PARK
RENTAL PRICES IN SURROUNDING AREAS
MULTI-FAMILY UNITS

A. SAN FRANCISCO:		
1. Geneva Apartments	3 Bedroom	$220
B. DALY CITY:		
1. Serramonte Apartments	Studio	185
2. Daly City near BART	2 Bedroom	280
3. Daly City near BART	1 Bedroom	185
4. Southgate Apartments	Studio	200
C. BRISBANE:		
1. Large 1 Br. Apartments	1 Bedroom	180
D. SOUTH SAN FRANCISCO:		
1. South San Francisco	1-2 Bedroom	230
E. SAN BRUNO:		
1. Crystal Springs Terrace	Studio	195
2. Crystal Springs Terrace	2 Bedroom	299
3. "The Place", San Bruno	1 Bedroom	190

Source: Review of available local reference materials
by Keyser Marston Associates


A
B
C
D
E
PRESIDIO
GOLDEN GATE PARK
YERBA BUENA ISLAND
SAN FRANCISCO-BAY BRIDGE
Oakland
Alameda
U.S. NAVAL AIR STATION ALAMEDA
U.S. NAVAL SUPPLY CENTER
Inner Harbor
BAY FARM ISLAND
HUNTERS PT.
S.F. BAY NAVAL SHIPYARD
CANDLESTICK PARK
CITY & COUNTY OF SAN FRANCISCO
SAN MATEO COUNTY
Daly City
Colma
Brisbane
SAN BRUNO MOUNTAIN
South San Francisco
Pacifica
Sharp Park Dist
Edgemar Dist.
Pacific Manor Dist.
Vallemar Dist
Rockaway Beach Dist.
Linda Mar Dist
Pedro Point Dist
Montara
Moss Beach
San Bruno
Millbrae
Burlingame
Hillsborough
San Mateo
Foster City
SAN FRANCISCO INTERNATIONAL AIRPORT
COYOTE POINT PARK
SAN FRANCISCO STATE FISH AND GAME REFUGE
MONTARA MOUNTAIN
SWEENEY RIDGE
San Andreas Lake
San Francisco Bay
BAYSHORE FRWY
SKYLINE BLVD
JUNIPERO SERRA BLVD
EL CAMINO REAL
101
35
82
1
17
61
92

San Francisco is particularly effected by the imbalance between construction costs and rent levels, given the excessively high costs of new multi family construction related both to labor rates and building code requirements. This situation has stopped the construction of apartments in areas where there is a proven high rent level. For example, the second phase of the Golden Gateway has been delayed because the developers have concluded that it is not possible to attain the rent levels required to justify the construction. It should be noted that here the land costs have been artifically reduced given the fact that it is an urban renewal project. Further, the first phase of construction has been an outstanding success being within walking distance of downtown San Francisco employment.

The first phase of the Golden Gateway was successful after an initial somewhat slow lease up period due to the fact that at the time it was constructed, the Golden Gateway was pioneering a new residential area which was formerly the produce area.

It should be noted that the San Francisco Executive Park site would also be pioneering a new area in terms of market rate residential rental units. In terms of comparison between the two projects, the Golden Gateway project is adjacent to the major employment center in the Nine County Bay Area, namely, downtown San Francisco, whereas the Yerby site is adjacent to no such employment center. Further the Golden Gateway has an established phase one project and still the developers have concluded that it is not feasible to bring on the second phase. Therefore, it is clearly not possible for the Yerby Corporation to pioneer multi family construction at the subject site at this time or in the foreseeable future. The rent levels in the adjacent area are significantly lower that those achieved at the first phase of the Golden Gateway Center, in some cases, approaching 50% less. Thus, the magnitude of the differential between construction costs and rent levels at the Yerby site is so large that, in our professional judgment, it is not reasonable to expect that any opportunity will exist to develop multi family rental units in the foreseeable future at the Yerby site. The only opportunity for rental units would be through the purchase of the site by a public agency such as the San Francisco Housing Authority and construction of units using some publicly assisted program.

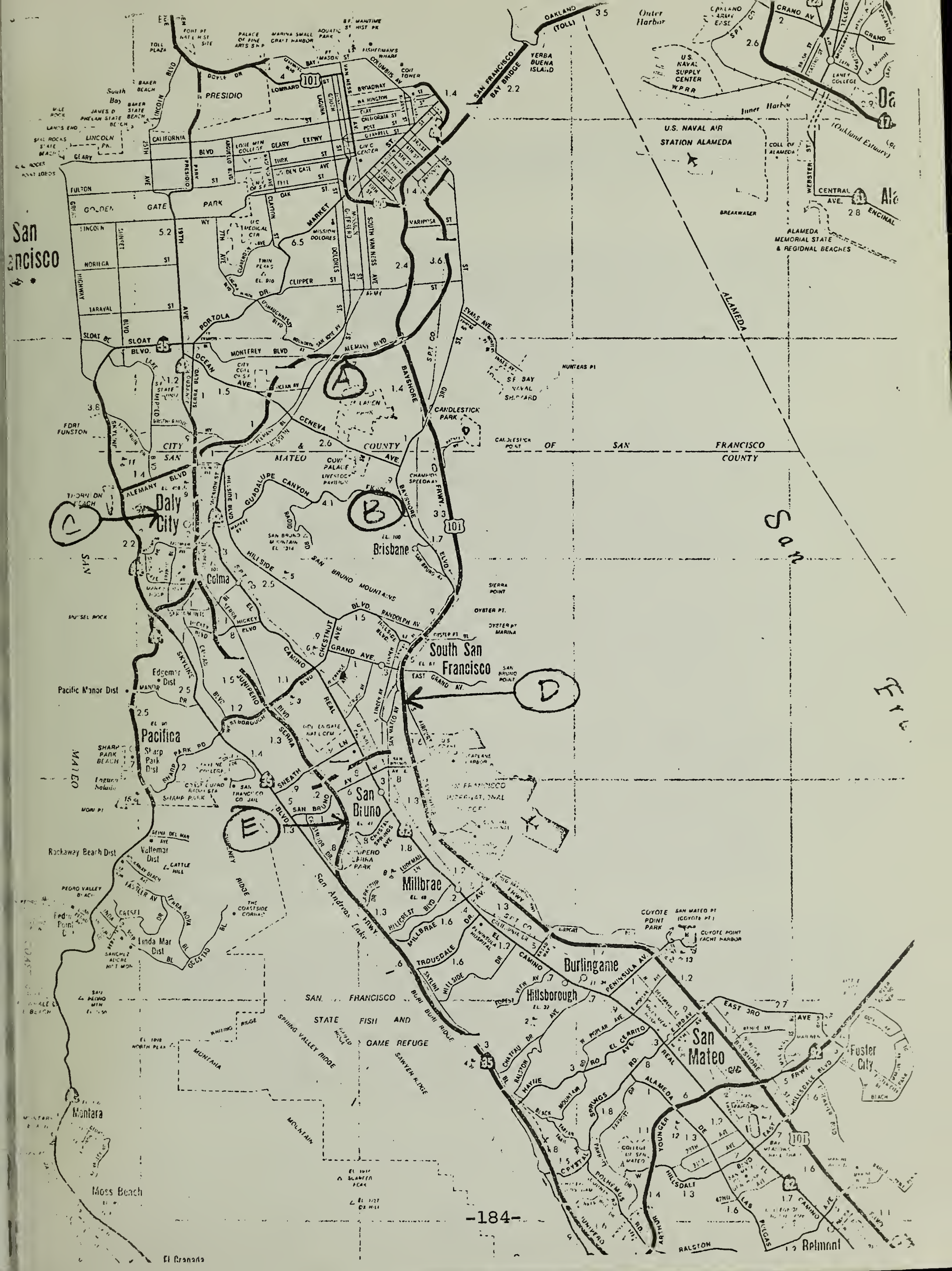
Single Family Sale Residential Development

The sales prices of residential units in the vicinity have been sampled on a representative basis as shown on the table and map key following this page. It is noted that the sales prices range from

SAN FRANCISCO EXECUTIVE PARK
SALE PRICES IN SURROUNDING AREAS
SINGLE FAMILY UNITS

A. SAN FRANCISCO:		
1. Visitacion Valley	3 Bedroom	$40,000
B. NORTH BRISBANE		
1. Little Hollywood	2 Bdrm., 1 bath	26,500
2. Little Hollywood	3 Bdrm., 2 bath	48,750
3. Little Hollywood	4 Bdrm., 2 bath	49,500
4. Bayview	2 Bdrm., 1½ bath	29,950
C. DALY CITY:		
1. Daly City	4 Bdrm., 2 bath	59,950
2. Daly City	3 Bedroom	41,950
3. West Park Townhouse	3 Bdrm., 2½ bath	55,950
D. SOUTH SAN FRANCISCO:		
1. South San Francisco (Buri-Buri Ridge)	4 Bedroom	51,950
2. South San Francisco (Townhouse)	3 Bdrm., 2½ bath	51,950
3. South San Frnacisco	3 Bedroom	55,750
E. SAN BRUNO:		
1. San Bruno Rancher	3 Bdrm., 2 bath	49,500
2. Crestmoor Park	3 Bdrm., 2 bath	73,950
3. San Bruno	2 Bdrm., 1 bath	34,000
4. San Bruno	3 Bdrm., 1 bath	35,500
5. San Bruno	3 Bdrm., 2 bath	42,500
6. San Bruno	4 Bdrm., 2 bath	50,000

Source: Field survey and review of available local reference materials by Keyser Marston Associates


A
B
C
D
E
San Francisco
Daly City
Colma
Brisbane
South San Francisco
Pacifica
San Bruno
Millbrae
Burlingame
Hillsborough
San Mateo
Foster City
Belmont
Montara
Moss Beach
El Granada
Presidio
Golden Gate Park
Twin Peaks
San Bruno Mountains
Cow Palace
Candlestick Park
San Francisco Bay Bridge
Yerba Buena Island
U.S. Naval Air Station Alameda
Alameda Memorial State & Regional Beaches
City & County of San Francisco
San Mateo County
San Francisco International Airport
San Andreas Lake
San Francisco State Fish and Game Refuge
Sharp Park
Edgemar
Vallemar Dist
Linda Mar Dist
Rockaway Beach Dist
Pacific Manor Dist
Coyote Point Park
Oakland (Toll)
Outer Harbor
Inner Harbor
101
35
San Fra

$25,000 up to the high of $50,000 with one exception for single family homes. In our professional judgment, the development of the site for the sale of single family home units, as in the case with rental units, would be a pioneering effort. In general, people are willing to rent in pioneering areas as opposed to established areas more readily than purchasing homes.

The average home purchaser regards his house as his largest single investment and is looking for security for that investment and maximum appreciation. This factor is partly responsible for the movement of the middle class from the core area cities, such as San Francisco, to suburban locations. In terms of home purchasers, there is a clear hiararchy of preference by representative home purchasers that starts with a single family home on a detached lot, the next level is a town house detached, then town house attached, and finally, a condominium unit in an apartment type development complex.

The site has negative characteristics for residential development such as (1) its relative isolation from other quality residential areas, (2) the proximity of the Bayshore Freeway on the north and Candlestick Park on the south.

Based on our extensive experience in evaluating feasibility of introducing market rate housing into central cities, in our judgment, there would also be a problem for the site of being perceived as a "high crime area." To overcome these existing negative factors in terms of residential sales housing at the site, an extraordinarily high level of amenities would have to be developed at the site and additionally, the type unit offered at the site would have to have a single family quality or character to it. Clearly it is not possible to develop the site in suburban single family densities of say four to six per acre.

At the other end of the housing spectrum, it is also, in our judgment, not possible to develop the site for apartment type condominiums which in the mind of the purchasing public would be probably associated with the subsidized housing projects that formerly occupied a portion of this site and are in the vicinity of the site to the north. Thus the residential development concept would of necessity be town house, most probably of an attached nature of high density, say 20 to 25 units per acre. These units as noted would have to have extraordinarily high levels of amenities.

Given the foregoing, a modestly sized unit of, say, 2 bedrooms and 1 and 1/2 baths would have to be priced in the $65,000 to $80,000 price range. Clearly, there is a significant gap between the sale price of adjacent single family units which are primarily of a single family separate lot quality and the attached town house development concept described above. The gap is so large that without the donation of the land and substantial public subsidy in terms of interest rates, etc., residential sale unit development at the site would not be possible.

A somewhat comparable project developed below Telegraph Hill illustrates the foregoing conclusion. This project is introducing residential sale units of a condominium nature, developed in the concept of an urban village in what is a non residential area currently. The site has many distinct advantages over the San Francisco Executive Park for the sale of residential units. First, it is relatively adjacent to both the recreation and eating areas of Fisherman's Wharf, located to the northwest, and the major employment sectors of the downtown area, located to the south. Secondly, the site is attempting to relate directly to the prestige residential units located on Telegraph Hill that are in the immediate proximity. This project, despite its distinct superiority in terms of site location over the San Francisco Executive Park for the development of residential units, in our professional opinion, is experiencing extreme difficulty in terms of the sale of units. By normal standards the project cannot be classified as a success. Given the lack of many of the factors that would make for success at the Telegraph Landing site, namely adjacency of prestige residential, walking distance to major employment and entertainment areas, there is no basis for assuming that it is possible to successfully develop residential sale units at the Yerby site. Rather, all evidence points in the opposite direction that such a project would be a total financial failure.

Industrial Use of the Site

Nation-wide the trend is for industrial development to be moving out of central cities, such as San Francisco, to suburban locations within the metropolitan area. There are numerous factors causing this trend i.e., better suburban highway access, lower property taxes, and suitable land areas for industrial development, i.e. large, relatively level, stable high load bearing lands.

To provide additional background on this subject, available material was reviewed and the following pertinent information is noted:

- -- Demand for industrial space -- including manufacturing plant space and warehousing -- is estimated to decline by 2.7 million square feet through 1985, with a probable decline totaling 4.6 million square feet by the year 2000. A potential demand exists for new warehousing space of up to 700,000 square feet by 1985; whether such space will be constructed depends on the availability and cost of land.*

-- Southern Bayshore

The part of this area east of James Lick Freeway and south of Third Street (South Basin) has very limited, if any, potential for new industrial uses, even warehousing uses. Generally, access is less direct and more in conflict with residential, commercial, and commuter traffic than in the area west of the freeway or in the Northern Bayshore area. Although a redevelopment project for industrial use might attract new warehousing uses, manufacturing use is less likely. As a result, more employment could be lost from displacement of existing activities than would be gained from redevelopment.

Support of existing industrial uses in the South Basin Area would probably require, at minimum, a major improvement in access. Reuse for industrial purposes through redevelopment and rebuilding is one possible strategy, as suggested in the South Bayshore Plan. However, projections of employment and land requirements indicate that no demand exists for land in this area apart from warehouse use. Nearby South San Francisco offers lower taxes and better highway, rail, and airport access.*

-- With respect to the South Basin-Candlestick Cove area, future declines in industrial employment and use are very likely, resulting in land potentially available for other use. The most likely use is non-industrial.*

Project Economic Feasibility Without High Rise Office Development

The issue has been raised as to the economic feasibility of the project without the high rise tower development. The term "economic feasibility" is used in many contexts, for purposes of our evaluation it is defined as "providing a rate of return to the developer that makes the risks of development worth undertaking."

---

* Commercial and Industrial Activity in San Francisco: Present Characteristics and Future Trends, Arthur D. Little, Inc. Prepared for the San Francisco Department of City Planning, June, 1975.

Keyser Marston Associates has advised the developer that the project as presently proposed is "pioneering" a new area. Currently lenders are in a very conservative mood and less willing than usual to pioneer areas or projects.

Downtown San Francisco is a premium location and well established. This is where most lenders are willing to lend. The remainder of San Francisco does not enjoy the same reputation in terms of security of investment as downtown San Francisco, particularly for office space development. Based on our extensive experience with lenders, it is our conclusion that many lenders view San Francisco as a city faced with "urban problems." Thus, in general, it is easier to get financing in suburban locations rather than San Francisco locations that are non-downtown or northern waterfront located.

The project as presently planned includes a mix of uses that provide a wide range of alternatives to users. For example, the office space user can choose between low rise garden office space and high rise "urban" office space.

At the present scale, the project provides a level of amenities such as extensive landscaping that enhances economic viability. The lender is very concerned with the mix of uses and the amenities offered.

If the project is reduced in scale by eliminating the high rise buildings, the return to the developer decreases and the risks increase. More than half of the proposed office space is in the high rise towers; elimination of the towers would reduce project income accordingly. Since the level of return is reduced, the developers ability to provide amenities is reduced, and his ability to market the space is hampered. This increases the level of risk. Additionally, the prospective office tenant has fewer choices available at the project which limits the project's appeal in the market place, further increasing the level of risk.

When risks increase, as described above, the willingness of lenders to make loans on the project decreases, particularly in the current conservative mood of lenders. Without financing, the project is not feasible. The more the risks are increased the less likely the project is to be able to compete with other less pioneering alternatives for financing.

Keyser/Marston Associates

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May 13, 1976

Mr. Stu During
Whisler-Patri
350 Pacific Avenue
San Francisco, California 94111

Dear Mr. During:

This is in response to your request for an evaluation of the economic impact of a modification of the plans for the San Francisco Executive Park that would substantially reduce the amount of on-site parking provided.

A decision to reduce parking availability, while maintaining the same scale of development, must assume that project occupants will make greater use of transit. At present, public transit service to the proposed site is non-existent. Even if the nearest bus line, the 29 Visitacion, is extended to the project area, most office users would still regard service levels as insufficient. The frequency of service and routing of the 29 line are not likely to meet the needs of a large fraction of employees and visitors. In this situation, a cut back in parking will adversely affect the marketability of the project.

The city could commit itself to still greater improvements in the level of transit service to the site. Before this commitment would be considered credible, there would have to be substantial evidence that the city was capable of meeting this commitment. Until improved transit service is visibly imminent, it is unlikely to affect lenders' willingness to lend or tenants' willingness to sign long-term leases.

More importantly, attempting to reorient this project toward primary transit dependency would begin to undercut its basic market strategy. The project is conceived as an alternative choice for those firms within San Francisco that are moving to garden office locations in San Mateo County because of the problems they experience in downtown San Francisco locations. For many of these firms, one of the primary problems is auto access and parking. This is particularly true for firms, such as sales organizations, that try to provide service to geographic areas outside of downtown San Francisco, where transit is often sparse, or need to move objects such as sample cases, for which transit is inconvenient.

The San Francisco Executive Park offers downtown San Francisco firms who now have to move to San Mateo County to find a garden office project with parking that meets their needs, an alternative location within San Francisco. To substantially reduce the parking spaces at the San Francisco Executive Park eliminates the above alternative.

Very truly yours,

KEYSER MARSTON ASSOCIATES

Michael Marston

Michael Marston
Partner

MM/jy

Keyser Marston Associates
Land Use Economics
Policy • Feasibility • Implementation
303 Sacramento Street
San Francisco, California 94111
(415) 398-3050

May 25, 1976

Mr. Stu During
Whisler Patri
350 Pacific Avenue
San Francisco, CA 94111

Dear Mr. During:

This is in response to your request for clarification of the expected impact of the San Francisco Executive Park on property values in the Little Hollywood area of the city.

In principle we would expect the project to have both positive and negative effects on adjacent property values. To the extent that there are additional nuisances such as increased traffic created by the project, residential property values could be lowered. However, since this project has been designed to keep traffic out of the neighborhoods, this impact is negated.

On the other hand, if the San Francisco Executive Park project is successful in creating and projecting a high quality image, the project might help to generally upgrade the image of the southeastern portion of the city adjacent to the project. This would have the effect of raising residential property values. In our opinion, however, the natural barriers that surround the project - the hill to the north, the Bay, the freeway, and Candlestick Park - will effectively insulate the adjacent residential areas from this property value impact. Residential property values will continue to be dominated by inflation.

In summary, it is our judgment that the San Francisco Executive Park as proposed cannot be expected to have a measurable impact on property values in adjacent residential areas.

Very truly yours,

KEYSER MARSTON ASSOCIATES

Frederick L. Norbury

Frederick L. Norbury
Associate

FLN:sth

Appendix J

Police Report

POLICE DEPARTMENT
CITY AND COUNTY OF SAN FRANCISCO
HALL OF JUSTICE
850 BRYANT STREET
SAN FRANCISCO, CALIFORNIA 94103

DRESS ALL COMMUNICATIONS:
DONALD M. SCOTT
CHIEF OF POLICE

OFFICE OF THE
CHIEF OF POLICE

August 4, 1975

IN REPLY, PLEASE REFER TO
OUR FILE: PR-396

Mr. Gordon H. Chong
Whisler-Patri
350 Pacific Avenue
San Francisco, California 94111

Dear Mr. Chong:

Attached hereto you will find a report which contains the estimated cost to provide police services to the completed Executive Park as proposed by the Yerby Corporation.

Very truly yours,

DONALD M. SCOTT
Chief of Police

By: George Sully
George Sully, Captain
Commanding Officer
Planning and Research Bureau

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att.

ENVIRONMENTAL IMPACT REPORT

FOR

WHISLER-PATRI

Prepared for:

Captain George Sully
Commanding Officer
Planning and Research Bureau

By:
Officer Robert Bernardini
July 1975

Under the provisions of San Francisco Planning Commission Resolution Number 6910 and required Environmental Evaluation Form, the organization known as Whisler-Patri, 350 Pacific Avenue, San Francisco, has requested that the San Francisco Police Department determine:

PROBLEM: Estimate the cost to provide police services to a proposed complex consisting of office building containing 860,000 square feet, retail shops containing 145,000 square feet and a 275 unit hotel and ultimately employing 4500 persons to be located in an area bounded by Harney Way, Jamestown, South side of Bayview Park and the Bayshore Freeway.

METHOD: Statistical information used to project the impact of the project's cost for police services will be derived from a portion of United States Census Tract 610, San Francisco Police Plot C-42, Department of Public Works Downtown Traffic Survey and other empirical inputs.

1. Establish the average number of incidents for which a police report was generated in the project area during a 12-month period. The general area, Police Plot C-42, generated 439 reported incidents, which represent 4.6% of the incidents occurring in the Southeast Police District.
2. Compute the existing ratio of reported incidents per thousand population in Census Tract 610. The results indicate that 292.6 incidents were generated for every one thousand persons. Normally, we could expect an increase in population of 4500 persons to generate approximately 1316 incidents; however, a comparison of this proposed development to a similar area indicates that we could expect an increase of 157 incidents for which a police report would be made in a one year period.

3. Establish the average number of vehicles that could be generated by the proposed development. Utilizing traffic generation data, provided by the San Francisco Downtown Parking Report, prepared by the San Francisco Department of Public Works, we believe that the 860,000 square feet of office space, the 145,000 square feet of retail space and the 275 unit hotel will probably generate 1,727 additional vehicles per day.

CONCLUSION: It should be clearly understood that the proceeding projections are based upon the past activities reported in the project area and other geographical areas which have some similarity to the proposed project. We have purposely ignored some variables which could easily increase or decrease our projections. The correlation between these variables, social conditions, income level, ethnic make-up, and physical structures to crime are not clearly understood. The estimated cost for police services are based upon a comparison of the annual Department budget to the number of reported incidents. Therefore, given the above limitations, we feel that the proposed project could require an increase of $81,801 per year for police services.

POLICE DEPARTMENT

CITY AND COUNTY OF SAN FRANCISCO

HALL OF JUSTICE
850 BRYANT STREET
SAN FRANCISCO, CALIFORNIA 94103

SS ALL COMMUNICATIONS:
ONALD M. SCOTT
CHIEF OF POLICE

OFFICE OF THE
CHIEF OF POLICE

IN REPLY, PLEASE REFER TO
OUR FILE: PR-396

September 8, 1975

Mr. Gordon Chong
Whisler-Patri
350 Pacific Avenue
San Francisco, Ca. 94111

Dear Mr. Chong:

The San Francisco Police Department initially provided you with an environmental impact cost to service the proposed Executive Park. Your organization has since asked us to provide additional data pertaining to alternate land use in the same geographical area.

Proposal II

Mixed land use containing elementary school, public recreation, moderate income housing, and commercial.

If, according to your estimate, the completed project experiences a population increase of 3,250 people, we could expect an increase of 109 - 219 reported police incidents in a twelve month period. This figure includes the anticipated 735 people which represents 30% of the residents receiving rent subsidies. Our past experience indicates that public housing residents tend to become criminally victimized at a higher rate than the non-public housing population.

Cost to provide police services for proposal two is estimated to be $56,792 - $114,105 per year.

(Continued, next page)

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Proposal III

Light Industrial Use

It is difficult to assess this land use impact cost for police services without a figure representing population employment. If the completed project attracts a minimum of 500 employees and the current number of 292.6 reported incidents per year per thousand population holds, we could expect an increase of 146.3 incidents per year. However, comparison of this proposed land use to a similar land use area indicates that approximately 3/4 of 1% of the police district's reported incidents can be attributed to this type of land use. This would mean that we might experience an increase of 67 reported incidents per year at the cost of approximately $34,909.

Very truly yours,

DONALD M. SCOTT
Chief of Police

By: George Sully
Captain George Sully
Commanding Officer
Planning and Research Bureau

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Letters from Community Groups and San Francisco Fire Department on file with City Planning Department